PROJECT REPORT

ProFuture

MICROALGAE PROTEIN INGREDIENTS FOR THE FOOD AND FEED OF THE FUTURE

WORKABLE IDEAS & INITIATIVES
for a SUSTAINABLE ECONOMY

PROFUTURE

MICROALGAE PROTEIN INGREDIENTS FOR THE FOOD AND FEED OF THE FUTURE

THE PROJECT CHALLENGE:

Microalgae are widely recognized as the "protein of the future," yet the European sector faces a significant "regulatory ceiling." While over 72,500 species exist, only a fraction are authorized for food use. For the ProFuture project, scientific innovation in cultivation and product development was not enough; the consortium had to navigate the EU Novel Food Regulation (2015/2283), a complex and costly barrier that often prevents innovative SMEs from reaching the market.

OUR CONTRIBUTION:

As the strategic regulatory lead, WIISE provided the legal architecture necessary to transition scientific breakthroughs from the lab to the shelf. Our team conducted a comprehensive analysis of the legal hurdles for four target species *(Arthrospira platensis, Chlorella vulgaris, Tetraselmis chui, and Nannochloropsis oceanica)*, identifying critical gaps between research and licensing requirements.

We spearheaded policy advocacy within the Horizon4Proteins cluster, co-authoring high-impact policy briefs to streamline authorization processes. To reduce the financial burden on partners, we developed a roadmap for "Joint Authorizations," a collaborative strategy allowing multiple SMEs to share the costs of safety dossiers, effectively lowering the market entry barrier for the entire industry.

The assessment of *nutrition and health claims* was also performed to identify measures to increase the market appealing of microalgae and microalgae-based food products, with voluntary information to be provided in the labelling of these food products, in line with regulatory requirements from Regulation (EC) No 1924/2006 and Commission Regulation (EU) No 432/2012.

The colouring properties of microalgae were explored as an opportunity to place them into the market as *colouring foods* (i.e. food ingredient with colouring properties) or *colours* (i.e. food additives used to colour foods), with the latter complying with Regulation (EC) No 1333/2008.

The use of microalgae in the feed sector (i.e. feed material, feed additive) was also explored, considering the nutritional and health benefits derived from the addition in the conventional animal feed, but also the risks and the limits to be verified in terms of undesirable substances to guarantee the safety of animal health and, by reflex, human health due to the carry-over of such substances in the products of animal origin.

THE OUTCOME:

Through WIISE intervention, the project moved beyond theoretical research to achieve genuine market readiness. Our work provided the legal certainty required for industrial partners to reformulate diverse products—from vegan sausages to protein bars—ensuring they meet the standards for sale to 450 million European consumers. This effort successfully transformed "novel" scientific concepts into legally marketable food assets, securing a competitive edge for the European microalgae value chain. These products may be supported by *nutrition and health claims* to promote their nutrition and health properties to consumers.

The animal sector could also benefit from the reformulation of feed, by increasing the nutritional value and promoting health benefits that affects e.g. mortality rate and survival after birth, meat and milk quality, overall animal health status (with less need for veterinary medicines and antimicrobials).

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A. PROJECT CORE IDENTIFICATION

INTRODUCTION

Bridging the Gap Between Algae Research and the EU Market

With the global population expected to reach 10 billion by 2050, the demand for sustainable protein sources is a critical global challenge. Microalgae represent one of the most promising solutions due to their high nutritional value and low environmental footprint.

However, the transition from laboratory research to a competitive European industry is hindered by high production costs and the most complex regulatory framework in the global food sector: the EU Novel Foods Regulation.

Within the ProFuture consortium, WIISE provided specialized **expertise in Novel Food legislation and regulatory issue management**, by addressing the fundamental paradox of algae being ancient "superfoods," and the normative framework requiring a rigorous safety "passport" that most innovators cannot afford to obtain alone.

Our contribution ensured that the technical advancements made by researchers and industrial partners remained compliant with EU law, facilitating a smoother path for market uptake and supporting sustainable innovation.

I. FACT SHEET

FULL PROJECT TITLE (ACRONYM):

Microalgae Protein Ingredients for the Food and Feed of the Future (**ProFuture**)

PROJECT DESCRIPTION:

A Horizon 2020 research project aiming to scale up microalgae production and prepare the market uptake of microalgae proteins as ingredients for innovative and sustainable food and feed products.

REFERENCE PROGRAMME (CALL):

Horizon 2020 - Call: H2020-SFS-2018-2020

FUNDING BODY:

European Commission (Research and Innovation Programme)

CONTRACT ID:

Grant Agreement No.: 862980

SELECTION EXCELLENCE:

Highly competitive call, with 13,5% average success rate (1524 submitted proposals, 206 mainlisted over the three years from 2018 to 2020).

DURATION:

Start Date: 01/10/2019

End Date: 31/12/2023

PROJECT BUDGET:

Total € 9 448 451,25
EU contribution € 7 775 109,01
WIISE Net EU contribution € 220 675,00
WIISE total cost € 315 250,00

II. CONSORTIUM

CONSORTIUM:

- **Coordinator:** IRTA (Institute of Agrifood Research and Technology) – Spain
- **WIISE Role:** Technical/Regulatory partner.
- **Partners:** 33 European partners from 13 countries, including universities and research institutes, SMEs, large companies, and associations.

PARTNERS LIST:

- **IRTA (Institute of Agrifood Research and Technology)** – Spain (Coordinator) www.irta.cat
- **Allmicroalgae** – Portugal - www.allmicroalgae.com
- **Necton (Portugues Marine Cultures Company) SA** – Portugal - https://necton.pt/en/home-necton-en/
- **Allmicroalgae Natural Products SA** – Portugal - https://www.allmicroalgae.com/en/
- **GreenCoLab (Green Ocean Association – Collaborative Laboratory for the Development of Green Ocean Technologies and Products)** – Portugal - https://www.greencolab.com/
- **Calé (Traditional Portuguese Confectionery)** – Portugal - https://confeitariacale.pt/
- **Gvtarra** – Spain - https://www.gvtarra.com/
- **CNTA (National Center for Food Technology and Safety)** – Spain - https://www.cnta.es/en/home-2/
- **AlgoSource Technologies** – France - https://algosource.com/
- **Apexagri SAS** – France - https://www.apexagri.com/?lang=en
- **Wageningen University & Research** – Netherlands - www.wur.nl
- **University of Twente** – Netherlands - https://www.utwente.nl/en/
- **Givaudan BV** – Netherlands - https://www.givaudan.com/
- **FoodCompanions BV** - Netherlands
- **Ghent University** – Belgium - www.ugent.be
- **EUFIC (European Food Information Council)** – Belgium
- https://www.eufic.org/en/
- **ILVO (Flanders Research Institute for Agriculture, Fisheries and Food)** – Belgium
- https://ilvo.vlaanderen.be/en/
- **Nuscience** – Belgium
- https://www.nuscience.eu/
- **INVE Technologies** – Belgium - https://www.inveaquaculture.com/
- **DIL (German Institute of Food Technologies)** – Germany - www.dil-ev.de

- **Viva Maris GMBH** – Germany - https://www.viva-maris.de/
- **Axia Innovation GMBH** – Germany - https://www.axia-innovation.com/en/home/
- **Civitta** – Estonia - www.civitta.com
- **WIISE (FARE - Food and Agriculture Requirements)** – Italy - wiisebenefit.com, fareagrifood.com
- **COOP Italia – Società Cooperativa SCRL** - https://www.coop.it/
- **Enervit Spa** - https://www.enervit.com/en
- **Tradizioni Padane Srl** - Italy
- **NORCE Research AS** – Norway
- https://www.norceresearch.no/en/
- **Alver World SA** – Swizterland - https://www.alver.world/
- **ESU-Services GMBH** – Switzerland - https://esu-services.ch/
- **ZSI (Centre for Social Innovation)** – Austria - https://www.zsi.at/
- **Vitafort Zrt** – Hungary - http://vitafort.hu/?lang=en
- **RDC Informatics S.A.** – Greece - https://www.rdc.gr/en/normal/home

GEOGRAPHICAL SCOPE:

Countries Involved:

Spain, Portugal, France, Netherlands, Belgium, Italy, Germany, Estonia, Norway, Switzerland, Austria, Hungary, Greece (13 countries).

Pilots:

Microalgae cultivation and processing optimized at farms and pilot plants in Portugal and Spain. Industrial-scale production led by nine large companies across seven European countries.

III. MISSION AND OBJECTIVES

MISSION

To create cost-effective and environmentally responsible microalgae production technologies capable of providing sustainable, protein-rich foods and feeds to the European market.

SPECIFIC OBJECTIVES

1. **Optimize Production:** Increase cost-efficiency and sustainability of large-scale microalgae cultivation using innovative technologies.
2. **Ingredient Development:** Produce viable single-cell proteins and protein isolates characterized for nutritional, safety, and techno-functional properties.
3. **Product Reformulation:** Create six types of protein-rich food products (e.g., pasta, snacks, meat alternatives) and four types of feed products.
4. **Market Readiness:** Prepare successful market implementation through business models, consumer research and regulatory issue management.

IV. PROJECT RESULTS AND IMPACT

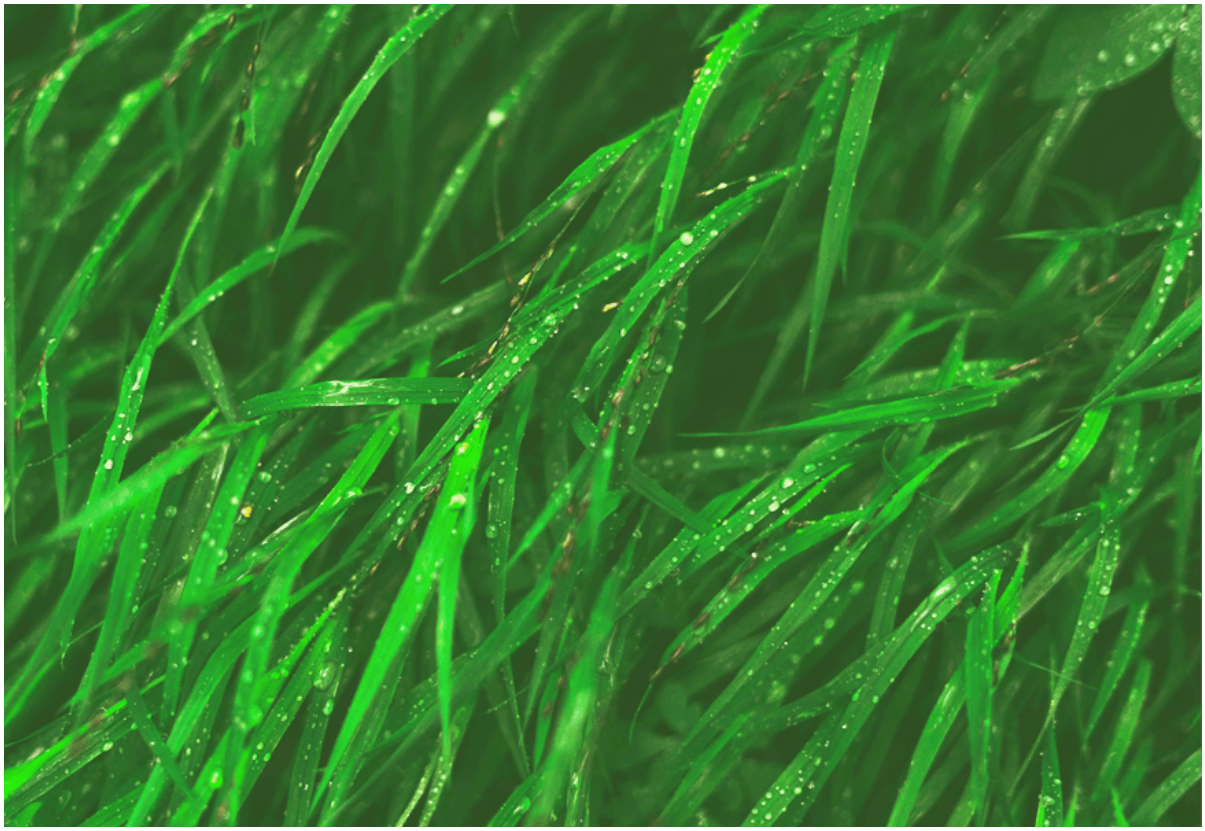
KEY PROJECT OUTPUTS

- Development of optimized microalgae cultivation and drying technologies (photobioreactors, fermentation, and solar drying).
- Creation of microalgae-enriched food products including vegan noodles, vegetable creams, and protein bars.
- Life Cycle Assessment (LCA) and Life Cycle Costing (LCC) reports for microalgae value chains.

PROJECT OUTCOMES

- Demonstration of a reduction potential of up to 88% for greenhouse gas emissions in cultivation through improved energy management.
- Enhanced understanding of European consumer segments and their "willingness to pay" for microalgae-based food.
- Establishment of a regulatory roadmap for navigating Novel Food authorizations.

B. FOCUS ON THE WIISE CONTRIBUTION



INTRODUCTION

WIISE served as the consortium's "regulatory engine," ensuring that technical breakthroughs remained aligned with strict European food safety laws. While partners focused on biological and industrial scaling, WIISE addressed the single biggest hurdle to market entry: the **Novel Foods Regulation (EU) 2015/2283**.

Our unique perspective integrated technical-regulatory compliance with strategic communication, contributing to transform a technical research project into a commercially viable strategic plan. We identified simplified authorization procedures and provided policy recommendations that bridge the gap between "Open Innovation" and "Market Impact”.

V. ROLE AND OBJECTIVES WITHIN THE PROJECT

ROLE IN THE CONSORTIUM

Technical Partner specializing in **Regulatory Issue Management** and **Policy Briefing.**

SPECIFIC OBJECTIVES

- Conduct a detailed analysis of the **Novel Food regulatory framework** to support market authorization for microalgae strains.
- Provide legal guidance on the evidentiary burden for **safety assessments** (e.g., Qualified Presumption of Safety)
- Identify simplified **authorization procedures** to reduce time-to-market for project outputs.
- Demonstrate how to maximise the commercial application of microalgae using them as *colouring foods* or *colours* (the latter prior pre-marketing authorisation).
- Assess the potential application of *nutrition and health claims* to facilitate the marketing of microalgae-based food products.
- Elaborate policy briefs to communicate regulatory challenges and opportunities to EU institution, advocating for **reforms to support the European "dietary shift"** toward more sustainable food productions.
- Bridge research activities with real-world market entry through specialized **dissemination on technical compliance topics**.

VI. ACTIVITIES AND WORK PACKAGES (WP)

PROJECT WORKPLAN TIMELINE (2019–2023)

The project was designed to move microalgae from niche research subject to a mainstream industrial food ingredient over a four-year period.

- **Year 1 (Months 1–12): Optimization & Analysis**
    - Setup of microalgae cultivation technologies (photobioreactors).
    - Initial analysis of the European microalgae value chain.
    - Regulatory mapping of Novel Food hurdles for the 4 target species.
- **Year 2 (Months 13–24): Biomass & Ingredient Development**
    - Optimizing drying and cell disruption technologies.
    - Characterization of protein isolates for nutritional and safety properties.
    - First consumer perception studies across Europe.
- **Year 3 (Months 25–36): Food & Feed Reformulation**
    - Incorporation of microalgae proteins into 6 food types (bread, pasta, snacks, etc.).
    - Testing of 4 feed types for poultry, fish, and shrimp.
    - Pilot plant production in collaboration with SMEs.
- **Year 4 (Months 37–48): Industrial Scale-up & Policy**
    - Industrial-scale production led by large food companies.
    - Finalization of Life Cycle Assessments (LCA).
    - Dissemination of Policy Briefs for regulatory reform.

CONTRIBUTION TO THE PROJECT WPs

Along each project phase, WIISE's intervention focused on overcoming the "Novel Food" bottleneck. Since most microalgae strains are considered "Novel" in the EU if not consumed before 1997, WIISE managed the path to legal commercialization.

Activity Groups	WIISE Activities
Analysis	Comprehensive analysis of the Novel Foods Regulation (EU) No 2015/2283 and its impact on microalgae startups and SMEs.
Research & Development	Evaluating the EU regulatory status of at least 30 microalgae strains out of the 72,500 strains currently authorized for food use.
Regulatory Management	Evaluation of simplified procedures for traditional foods from third countries as an alternative to full novel food authorization.
Stakeholder Engagement	Participating in the Horizon4Proteins cluster to activate network synergies among over 300 stakeholders for promoting "dietary shift" and listening to political demands.
Dissemination & Policy	Production of Policy Briefs within ProFuture and the Horizon4Proteins cluster to influence EU food policy.
Management	Support for regulatory compliance throughout the value chain, from ingredient production to food labelling, within the research consortium.

SUMMARY OF REGULATORY & TECHNICAL STEPS

As a partner of **WP9 (Regulation, Business Model and Marketing Strategy)**, WIISE focused on overcoming the legal barriers to entry for microalgae in the EU market.

Phase	Strategic Objective	WIISE Key Actions
I. Status Assessment	**Determine legal status**	Evaluated the 4 project species against the EU Novel Food Status Catalogue and the QPS (Qualified Presumption of Safety) list.
II. Value Chain Mapping	**Identify economic hurdles**	Analysed how current regulations (EU 2015/2283) disproportionately increase costs for microalgae SMEs.
III. Alternative Pathways	**Simplify authorization**	Investigated the 'Consultation process' and the "Notification for Traditional Foods" as a faster, cheaper alternative for strains with history of use outside the EU.
IV. Policy Advocacy	**Long-term reform**	Co-authored Policy Briefs recommending that EU-funded research results include the costs of regulatory licensing.
V. Exploitation Support	**Market Readiness**	Advised industrial partners (Givaudan, Argal, etc.) on labelling, including nutrition and health claims requirements for the new products.

VII. RESULTS, IMPACT, AND OPPORTUNITIES

SPECIFIC PROJECT OUTPUTS PRODUCED BY WIISE

Policy Briefs: Specific recommendations on the "dietary shift" and regulatory reforms needed for alternative proteins.

Regulatory Roadmaps: Detailed assessment of the evidentiary burdens (e.g. toxicity/cytotoxicity) required by EFSA for novel food dossiers.

Technical Publications: Wide-reaching dissemination of project results through proprietary platforms (Foodtimes) and professional venues.

IMPACT GENERATED BY WIISE

Lowered the evidentiary burden for partners by identifying existing safety data and simplified procedures.

Reduced the "informational gap" for consortium partners regarding EFSA's toxicity and notification requirements, preventing costly compliance errors during food reformulation.

Advocated for the use of "legal entities" (like consortia and associations) to share the burden of authorization costs.

OPPORTUNITIES CREATED

Established a foundation for the "Horizon4Proteins" cluster to influence EU food policy.

Established a collaborative framework with other EU projects (NextGen Proteins, Smart Protein, SUSINCHAIN, Giant Leaps, LIKE-A-PRO) to harmonize alternative protein safety standards.

Provided technical-legal mediation to help innovative startups and SMEs in the consortium navigate the onerous costs of EFSA licensing.

Facilitated the "One Health" approach by linking microalgae innovation to broader EU policy goals like the Green Deal and carbon upcycling.

CONCLUSION

LESSONS LEARNED

The ProFuture project demonstrated that *'Open Innovation'* is incomplete without *'Open Regulation'.* We have integrated these insights into our consultancy to help WIISE's clients navigate **Qualified Presumption of Safety (QPS) and notification procedures** more effectively. We ensure that the costs of studies required by EFSA (e.g. nutrition, toxicological, allergenicity) are strategically planned at the earliest stages of R&D to avoid late-stage bottlenecks.

WHY PARTNER WITH WIISE?

Our leadership in dismantling the "regulatory ceiling" for microalgae in the **ProFuture** project proves we are the essential partner for high-tech innovation consortia requiring:

- **Regulatory Architecture:** Proven expertise in navigating **Regulation (EU) 2015/2283**, transforming complex Novel Food barriers into clear market-entry roadmaps through **QPS (Qualified Presumption of Safety)** and notification optimization.
- **Strategic Advocacy:** Active leadership in EU policy clusters (e.g., **Horizon4Proteins**), with a track record of authoring high-impact policy briefs that influence the European "dietary shift" and legislative reforms.
- **Collaborative Scaling:** Unique experience in developing **"Joint Authorization"** strategies, allowing consortia to share the financial and evidentiary burdens of EFSA dossiers, thereby de-risking R&D for SMEs and industrial giants alike.
- **From Lab to Shelf:** Specialized ability to bridge the gap between "Open Innovation" and "Market Impact," ensuring that scientific breakthroughs are legally marketable assets for 450 million European consumers.

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