a4f
algae for future

TESTIMONIAL FROM SUCCESSFUL DEMO PROJECTS

22nd April 2026

SUMMARY

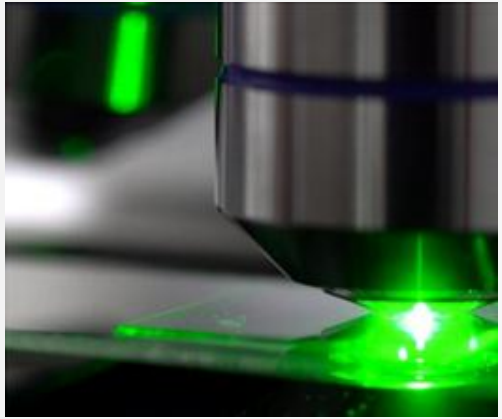
1. A4F - Who We Are
2. A successful project application: the MULTIPLY Project
3. Building MULTIPLY's Business Case and Business models
4. Final remarks

WHO WE ARE

A4F provides services in the microalgae, macroalgae and biorefinery sectors, specializing in the development of bioprocesses and in the design–build–operate–transfer (DBOT) of commercial scale algae production facilities.

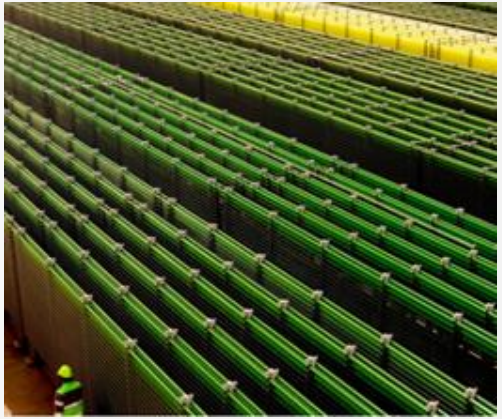
WHAT WE DO

APPLIED R&D



CONTRACT R&D
TECHNOLOGY SUPPLY

INDUSTRIAL PROJECTS



A4F IN NUMBERS

Founded in 2008

People

- **40+** highly skilled people
- > 50 % PhD & MSc
- **18 years of accumulated experience** in microalgae industrial production

Co-funded Projects

- **30+** R&D projects since FP7
- Participating in **15** collaborative R&D projects
- Scaling-up microalgae and macroalgae production and downstream processes

Units Operated

- **6 units**, from R&D to Commercial Scale
- **Currently** building **3 industrial units** in Europe and Middle East
- Currently involved in other projects abroad: South America, Africa…

INDUSTRIAL PROJECTS

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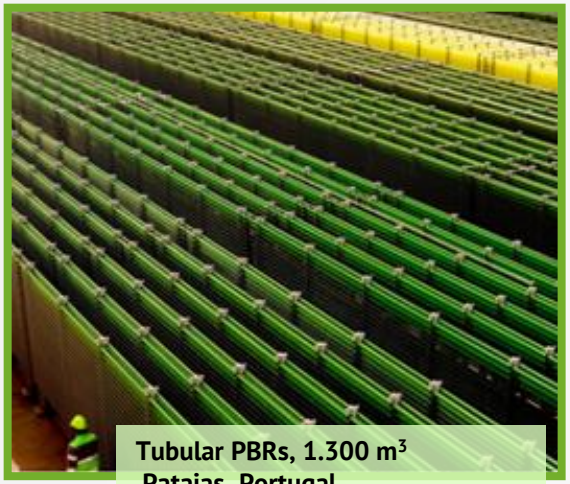
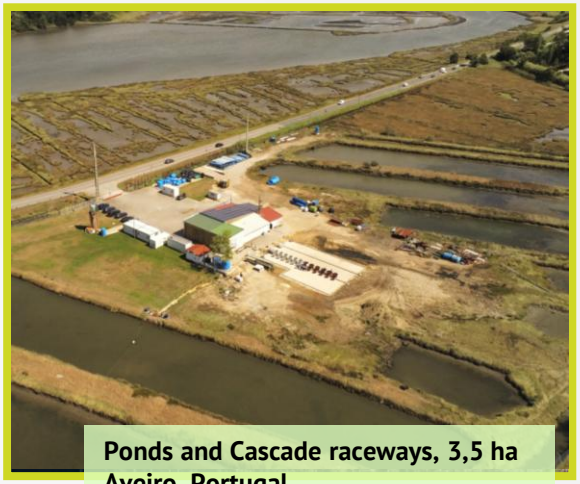


Tubular PBRs, 1.300 m^3
Pataias, Portugal
Designed, built, operated by A4F

Multi-technology production, 14 ha
Póvoa de Santa Iria, Portugal
Final implementation stage



Ponds and Cascade raceways, 3,5 ha
Aveiro, Portugal
Implementation stage

a4f algae for future

R&D TRACK RECORD

Applied R&D in Biotechnology

Jan 2011
GIAVAP (FP7)
36 months | 7M€

Apr 2011
BIOFAT (FP7)
60 months | 10M€

Oct 2012
PHOTO.COMM (FP7)
48 months | 3.9 M€

Dec 2012
DEMA (FP7)
54 months | 6.4M€

Nov 2013
PUFACHAIN (FP7)
48 months | 7M€

Dec 2013
D-FACTORY (FP7)
48 months | 10M€

Dec 2014
ALFF (H2020)
48 months | 3.8M€

Jul 2015
PHOTOFUEL (H2020)
48 months | 6M€

Mar 2017
ABACUS (H2020)
48 months | 5.1M€

Nov 2017
EnhanceMicroalgae (Interreg Atlantic Area)
71 months | 2.45M€

Oct 2022
Pacto Bioeconomia Azul (PRR)
38 months | 133M€

Oct 2022
ALIGNED (HorizonEU)
36 months | 3,4M€

Oct 2022
CIRCALGAE (HorizonEU)
48 months | 10M€

May 2021
REDWine (EU-BBI-JU)
48 months | 5,7 M€

Dec 2020
Move2lowC (P2020)
36 months | 11.2M€

May 2020
MULTI-STR3AM (EU-BBI-JU)
48 months | 9.1M€

Apr 2020
ALGAREF (P2020)
24 months | 2.8M€

May 2019
EXTRATOTECA (P2020)
36 months | 1.4M€

Nov 2017
ARA-FARM (P2020)
48 months | 4.7M€

Jan 2023
ASTEASIER (EIC Transition)
24 months | 2M€

Jun 2023
INNOAQUA (HorizonEU)
48 months | 7.3M€

Jun 2023
InnoProtein (CBE-JU)
48 months | 5M€

Jun 2023
CAPTUS (HorizonEU)
48 months | 11.5M€

Feb 2024
Bluewayse (SBEP)
36 months | 2.3M€

May 2024
FLEXBY (HorizonEU)
48 months | 4M€

May 2024
SusAlgaeFuel (HorizonEU)
48 months | 3.5M€

Jun 2024
Nutritive (HorizonEU)
48 months | 7M€

Sep 2024
TexMaTer (HorizonEU)
48 months | 6M€

Jun 2025
MULTIPLY (CBE-JU)
48 months | 7.5 M€

CONFIDENCE BUILT ON **EXPERIENCE**

MULTIPLY - MULTIPLYING FEASIBLE MICROALGAE-DERIVED PRODUCTS AT SCALE

HORIZON-JU-CBE-2024-IA-02 Sustainable micro-algae as feedstock for innovative, added-value applications

MULTIPLY

MULTIPLY aims to demonstrate **economically feasible and environmentally sustainable microalgae cultivation and biorefinery processes**, for the provision of valuable algal ingredients, suited for the formulation of **mid-price products for the food, feed, biomaterials, cosmetics and lubricants industries**.

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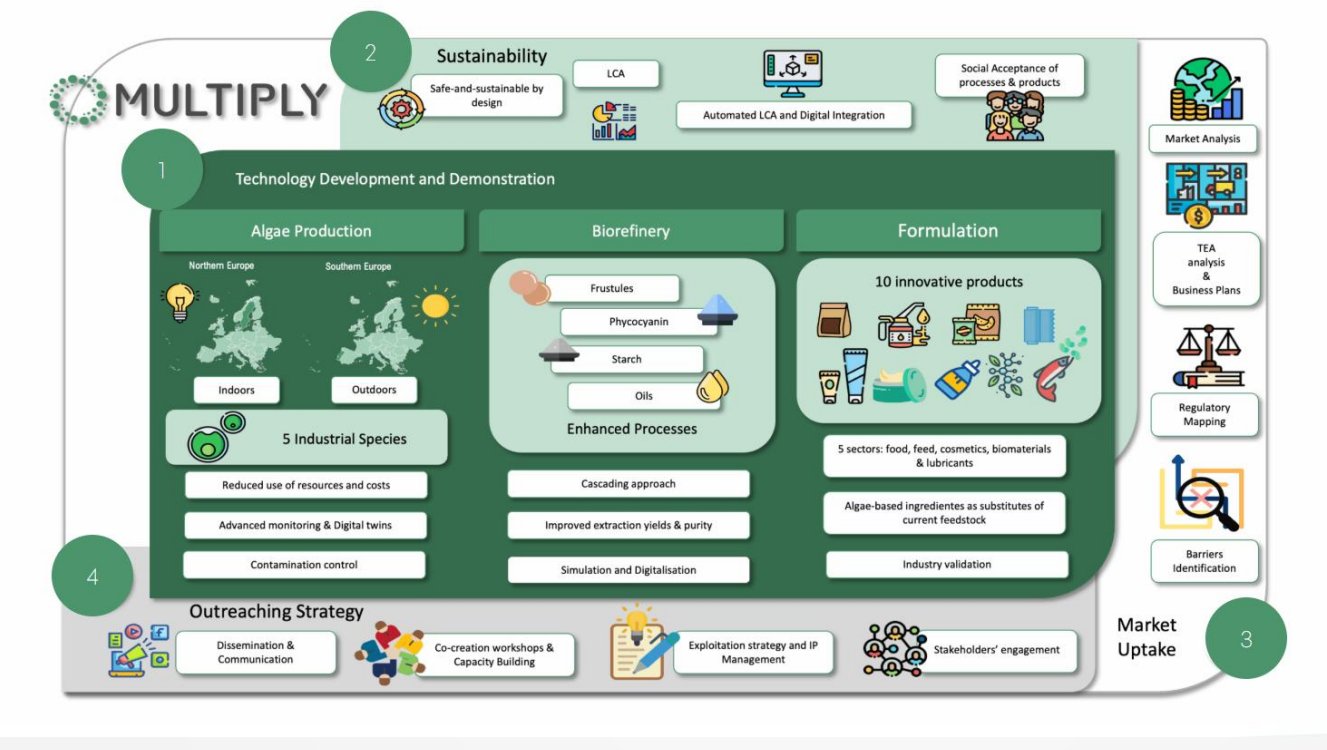
MULTIPLY - MULTIPLYING FEASIBLE MICROALGAE-DERIVED PRODUCTS AT SCALE



- 17 partners
- 10 countries
- 5 microalgae species
- 10 products

https://multiplyproject.eu

Circular Bio-based Europe Joint Undertaking

Bio-based Industries Consortium

Co-funded by the European Union

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BUSINESS CASES AND BUSINESS MODELS

From evaluation report (15/15):

The proposal presents a ***comprehensive*** *and* ***inclusive business model*** *that addresses market demands to replace less sustainable ingredients in existing processes and includes clear pathways for scaling and integration into existing value chains. The proposal clearly identifies solid business cases for microalgae producers, product formulators, technology providers and non-profit partners.*

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BUSINESS CASES AND BUSINESS MODELS: WHERE TO START?

1. Identification of the main products and partners involved
    1. Formulations of natural colors for food applications (GRA Nutra)
    2. Protein-rich, meat alternative food ingredients (EDONIA)
    3. Biomaterials for compostable films (NOVAMONT)
    4. Fatty-acid ingredients for cosmetics and lubricants (OLEON)
    5. Active packaging for cosmetics (AIMPLAS)
    6. Salmon feed formulations (NOFIMA)
2. Identification of other businesses emerging/growing due to MULTIPLY
    1. Microalgae biomass production and biorefining
    2. Technology providers (e.g. photobioreactors; DBOT services)

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STEP 1: PRELIMINARY MARKET ANALYSIS

1. Identification of main target sectors
    1. Bioplastics
    2. Organic dyes and pigments
    3. Plant-based meat / alternative protein sources for food
    4. Salmon feed
    5. Microalgae biomass

Markets driven by increased consumer **environmental awareness** and regulatory push towards **sustainability**

Fast-growing markets with strong drivers for innovation and sustainability performance

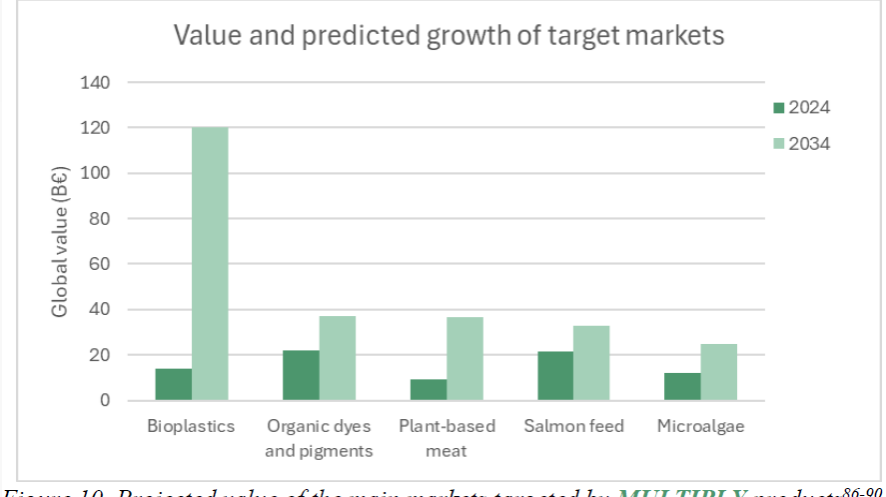

*Figure 10. Projected value of the main markets targeted by **MULTIPLY** products*[86-90].

Market drive for food ingredients: increasing demand for health and sports nutrition alternatives and for natural food supplements; growing number of vegetarian and vegan consumers

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    4.
    5.

Mark
enviro
push towards **sustainability**

Market drive for food ingredients: Growing number of vegans and vegetarians in Europe; increasing demand for natural food supplements; health and sports nutrition alternatives

Fast-growing markets with strong drivers for innovation and sustainability performance

Figure 10: Projected value of the main markets targeted by MULTIPLY products[86-90].

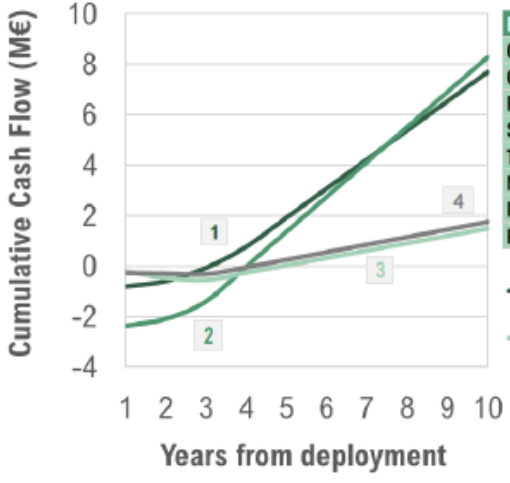
Show to the reviewers that there is potential for **market uptake** of the new products

STEP 2.1: PRELIMINARY BUSINESS CASES

Considering MULTIPLY will be successful and that the technologies are scaled-up after the project end, partners were asked to provide estimations of:

- CAPEX (€)
- OPEX/year (€)
- Production (kg or ton /year)
- Selling price (€/kg)

New algae-based products' business cases estimations (based on for-profit partner data)



Products	1	2	3	4
CAPEX (M€)	0.7	1.8	-	0.1
OPEX (M€/year)	3.9	3.1	1.2	1.7
Production (Ton/Y)	25	500	150	500
Sale Price (€/Kg)	200	9.0	10	4
Turnover (M€/Y)	5	4.5	1.5	2
NPV 10Y (M€)	7.7	8.3	1.5	1.8
IRR (%)	70 %	37 %	32 %	43 %
PBP (years)	4	5	5	7

1 - Food colorant
2 - Food ingredient
3 - Bioplastics
4 - Lubs & Cosmetics

Economic feasibility was assessed based on financial indicators: NPV (10 years) IRR, PBP

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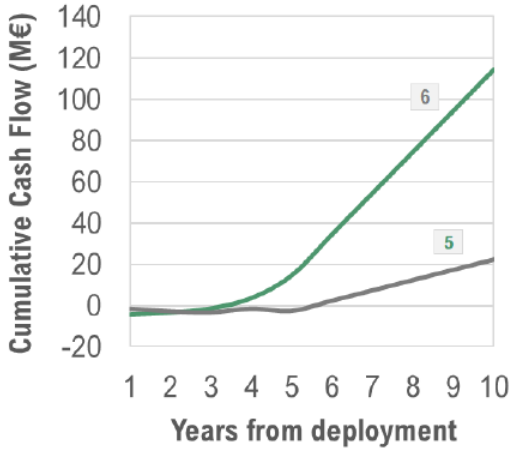
STEP 2.1: PRELIMINARY BUSINESS CASES

Business cases estimations for microalgae producers and technology providers



Products	5	6
CAPEX (M€)	74	8.8
OPEX (M€/year)	35	17
Production (Ton/Y)	1000	-
Sale Price (€/Kg)	65	-
Turnover (M€/Y)	65	22
NPV 10Y (M€)	115	22
IRR (%)	88 %	41 %
PBP (years)	4	6

5 - Microalgal Biomass Fractions

6 - PBRs

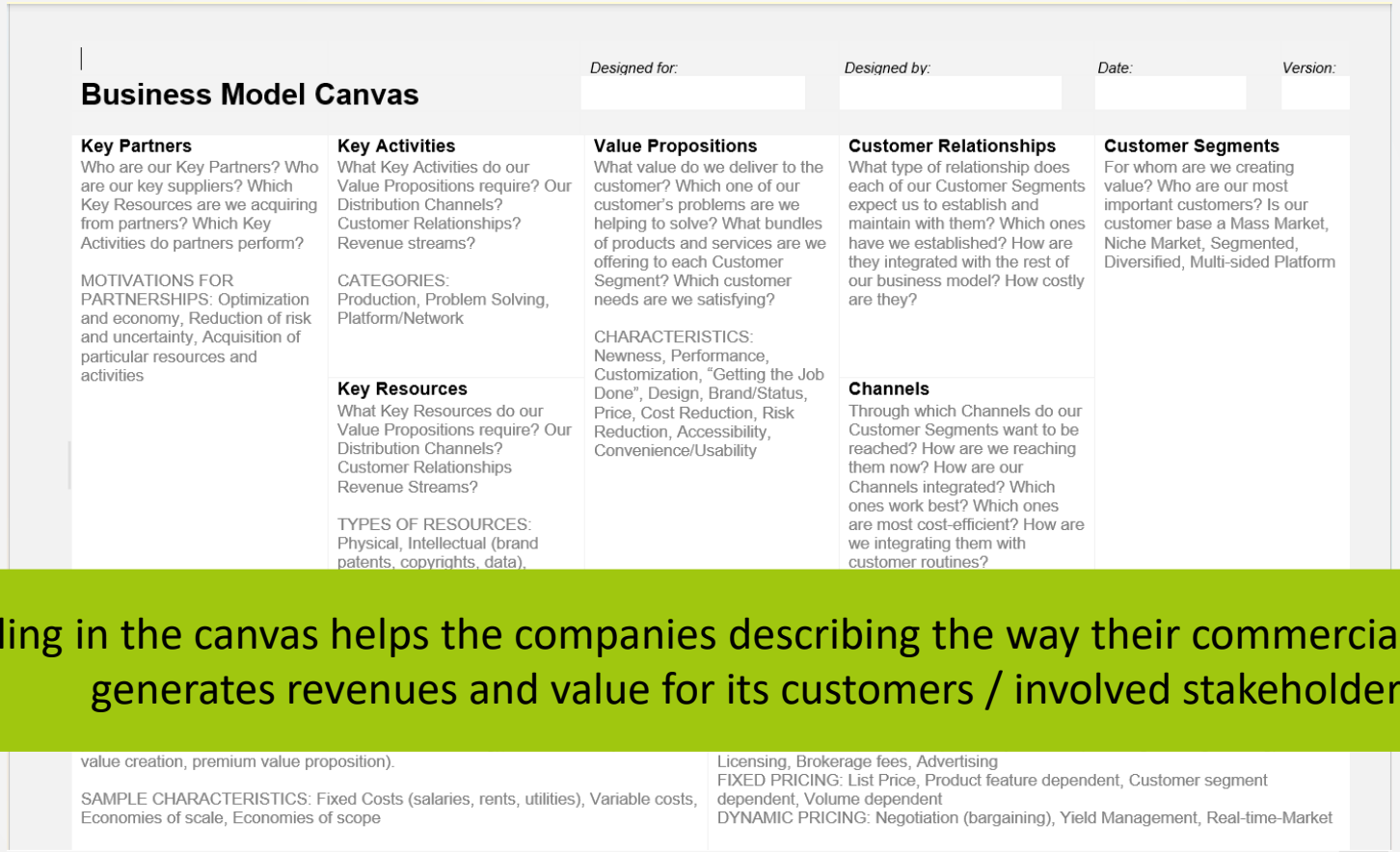
The preliminary assessments (to be further refined during the project) indicate that the foreseen businesses are feasible.

The Business Cases are based on the best estimate of several variables, including costs with high volatility (e.g., energy; raw materials) that can vary significantly over the next years.

Show to the reviewers that your project will most likely bring new viable businesses after the project end

STEP 2.2: PRELIMINARY BUSINESS MODELS

Partners were asked to fill in the Business Model Canvas



Business Model Canvas

Designed for: *Designed by:* *Date:* *Version:*

Key Partners
Who are our Key Partners? Who are our key suppliers? Which Key Resources are we acquiring from partners? Which Key Activities do partners perform?

MOTIVATIONS FOR PARTNERSHIPS: Optimization and economy, Reduction of risk and uncertainty, Acquisition of particular resources and activities

Key Activities
What Key Activities do our Value Propositions require? Our Distribution Channels? Customer Relationships? Revenue streams?

CATEGORIES: Production, Problem Solving, Platform/Network

Key Resources
What Key Resources do our Value Propositions require? Our Distribution Channels? Customer Relationships Revenue Streams?

TYPES OF RESOURCES: Physical, Intellectual (brand patents, copyrights, data),

Value Propositions
What value do we deliver to the customer? Which one of our customer's problems are we helping to solve? What bundles of products and services are we offering to each Customer Segment? Which customer needs are we satisfying?

CHARACTERISTICS: Newness, Performance, Customization, "Getting the Job Done", Design, Brand/Status, Price, Cost Reduction, Risk Reduction, Accessibility, Convenience/Usability

Customer Relationships
What type of relationship does each of our Customer Segments expect us to establish and maintain with them? Which ones have we established? How are they integrated with the rest of our business model? How costly are they?

Channels
Through which Channels do our Customer Segments want to be reached? How are we reaching them now? How are our Channels integrated? Which ones work best? Which ones are most cost-efficient? How are we integrating them with customer routines?

Customer Segments
For whom are we creating value? Who are our most important customers? Is our customer base a Mass Market, Niche Market, Segmented, Diversified, Multi-sided Platform

value creation, premium value proposition).

SAMPLE CHARACTERISTICS: Fixed Costs (salaries, rents, utilities), Variable costs, Economies of scale, Economies of scope

Licensing, Brokerage fees, Advertising
FIXED PRICING: List Price, Product feature dependent, Customer segment dependent, Volume dependent
DYNAMIC PRICING: Negotiation (bargaining), Yield Management, Real-time-Market

Filling in the canvas helps the companies describing the way their commercial activity generates revenues and value for its customers / involved stakeholders

COMBINING ALL INFORMATION

NEEDS & CHALLENGES

- Need to build a strong European bioeconomy using alternative and more sustainable feedstocks.
- Need to bring the microalgae sector to the forefront of core sustainable European industries.
- Challenge to up-scale microalgae industry with existing production and biorefinery technologies.
- Challenge to create mid-range price microalgae-based products.

EXPLOITATION

- **Project 2025-2029:** microalgae biotechnology production and biorefinery development → product development → testing & validation
- **Upscaling 2029-2031:** pilot scale installation and demonstration
- **Commercialization 2031+:** Upscaling to full-scale production + R&D for expansions to other products / increased uptake of microalgae-based products

IMPACT

- **Strategy:** direct commercialization, IP protection (licensing, patenting, trademark, royalties), R&D expansion to new products
- **Revenue:** 947 M€ expected in 2029-2034
- **Consumer segments:** cosmetics, food industry, bioplastics, pharma, etc

VALUE PROPOSITION

- High TRL development of microalgae biorefinery technology compatible with medium-value novel applications.
- High TRL development of a range of new microalgae-based products, meeting market needs for mid-range priced products.
- Zero waste and zero pollution approach, with optimal cascading use of feedstock.

RISKS

- Inertia in replacing existing products, time to market
- High cost for consumers, compared to existing products
- Benefits not understood by end-users
- Consumer resistance to change habits and adopt new products

MITIGATION

- Efficient communication campaign and dissemination strategy
- Market incentives, new funding opportunities
- Efforts to explore new markets

MARKET DRIVE

Driven by:

- Increased consumer environmental awareness & regulatory push towards sustainability;
- Growth in government initiatives & significant investment;
- Growing demand for sustainable products with reduced environmental impact;
- Specifically for food ingredients: Growing number of vegans and vegetarians in Europe; increasing demand for natural food supplements; increasing demand for health and sports nutrition alternatives.

Obstacles to market uptake: high price of products in comparison with traditional alternatives; performance of new products

MULTIPLY

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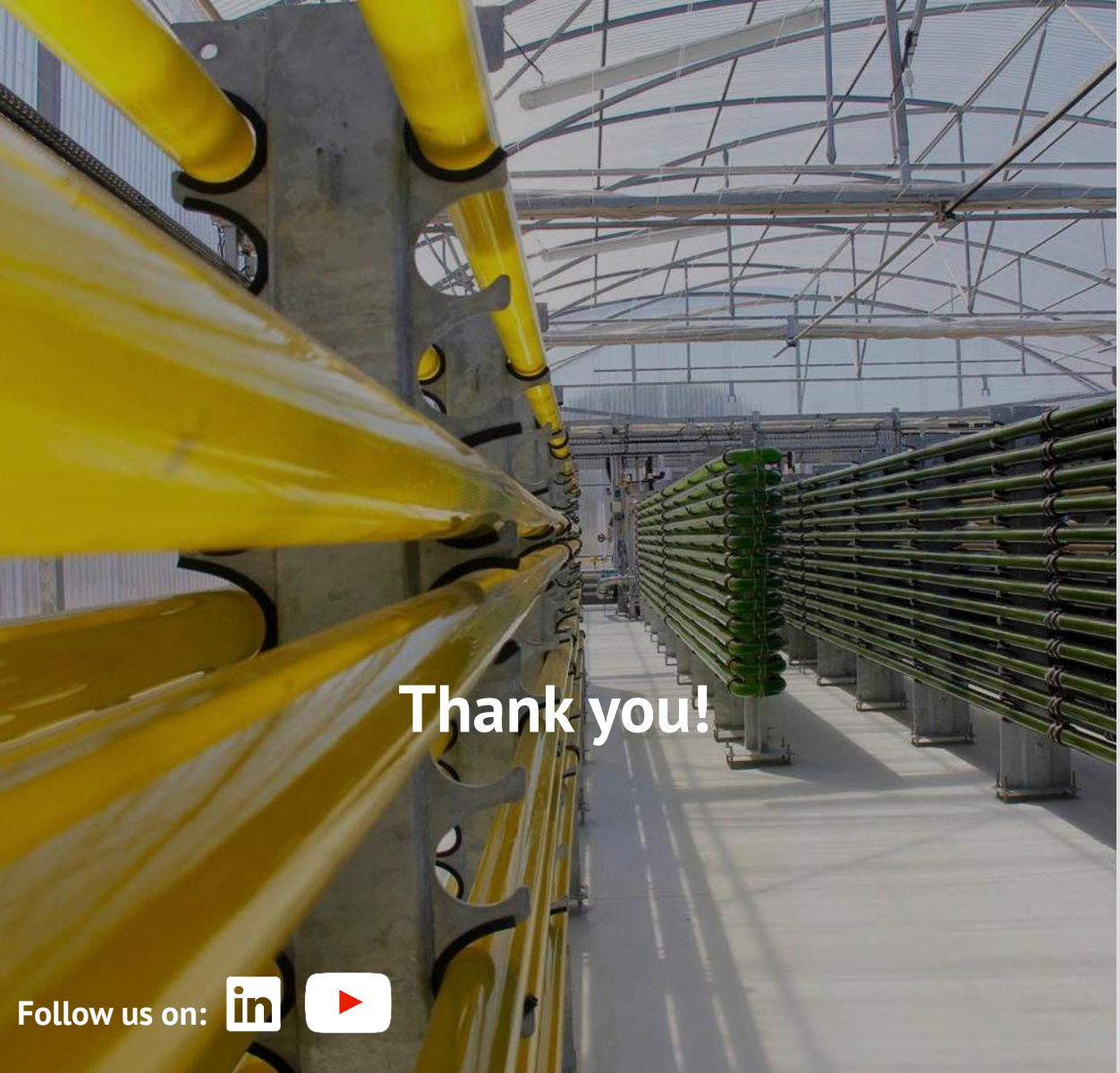
FINAL REMARKS

1. Business models and Business Cases require market and business data, often not available or easily estimated - don't leave this section for writing in the last days before submission!
2. Collaborate with the end-users of the technologies and products – they can provide the best available estimates
3. There is a lot of uncertainty in the data – identify what is affecting your analysis the most and make sure you are using the best available data
4. You might not be able to put all the information you have in the proposal. Be concise.



Thank you!

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