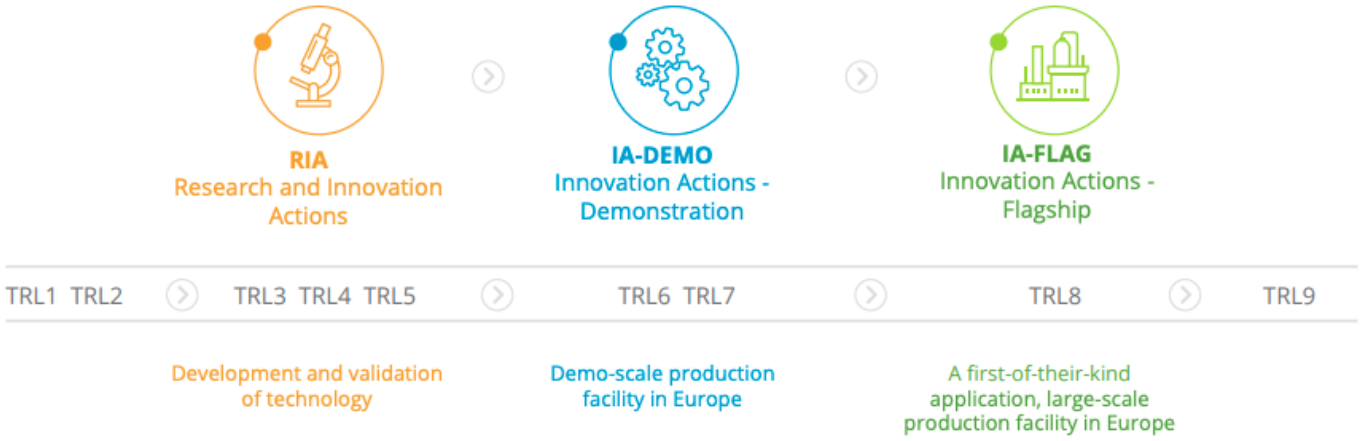
Proposition to join a European collaborative project

SUPERIOR BIO-BASED PACKAGING SOLUTIONS WITH MINIMAL ENVIRONMENTAL DAMAGE

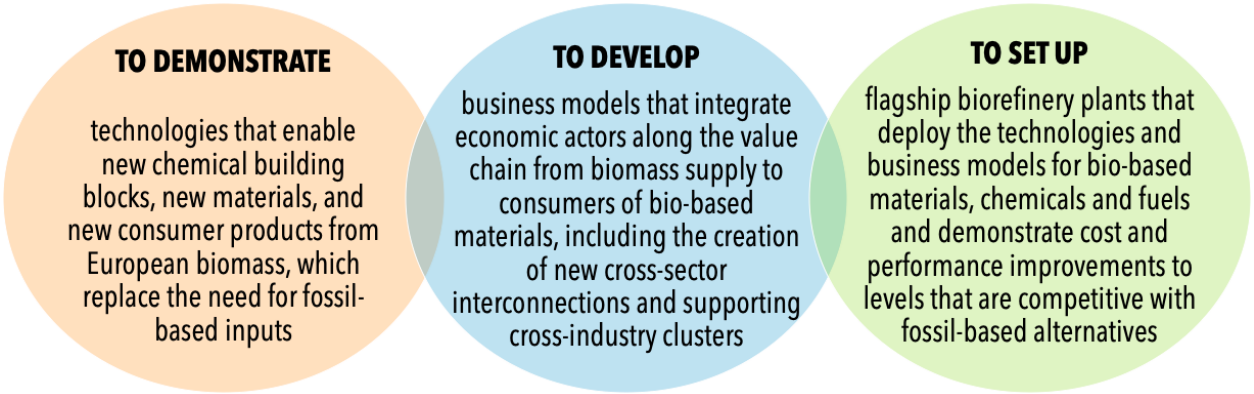
Funding Programme	H2020 – Bio-Based Industries (BBI)
Strategic orientation (SO)	3. Products: Develop innovative bio-based products for identified market applications
Topic identifier	BBI.SO3.D4
Maximum funding rate	Up to 70% for SMEs and Large Industries Up to 100% for Universities and Research & Technology Organisations
Indicative BBI JU contribution	€ 7 million
Deadline	03 September 2020 - single stage call
Project duration (if funded)	4-5 years
Type of action	Innovation action (IA) – demonstration action

THE BIO-BASED INDUSTRIES JOINT UNDERTAKING (BBI JU) FUNDING PROGRAMME

The **BBI JU initiative** is a public-private partnership between the European Union (EU) and the Bio-based Industries Consortium (BIC) operating under **Horizon 2020** rules and procedures. Every year, BBI JU launches calls for proposals to support research, innovation and demonstration projects developing innovative bio-based products and bringing together stakeholders along entire value chains, from biomass production to end-use applications.



BBI JU aims to contribute to a low-carbon, resource-efficient and greener economy while enhancing economic growth and creating more jobs. These main objectives are to:



The total indicative budget for 2020 is of € 102 million, including **€ 28 million** for IA projects.

SPECIFIC CHALLENGE:

Packaging is key to sustaining the **quality** and **durability** of consumer and industrial products through their lifespan. Today, most packaging materials are fossil-based and may cause environmental problems at the end of their life cycle if not properly managed.

For example, oxo-plastics (also called oxo-degradable plastics) are used in agricultural films, rubbish bags, carrier bags, food packaging and landfill covers. However, they break down into very small particles, potentially contributing to environmental (soil, marine, air) **contamination by microplastics** [1]. And not all biodegradable packaging materials disintegrate quickly enough to avoid becoming marine litter or contaminating the soil [2].

"Future of Packaging" - The Times - Oliver Balch et al. (2019)

With its 2018 **plastics strategy**, the European Commission has laid out plans to: (i) make all plastic packaging on the EU market recyclable by 2030; (ii) reduce single-use plastics; and (iii) restrict the intentional use of microplastics. Products made from oxo-degradable plastics will be banned from the EU market from July 2021.

Industry can develop and produce bio-based packaging materials that enable **better functional performance** than their fossil-based counterparts. This improved performance can be **improved gas-barrier functionality; longer shelf lives** for food-packaging applications**; and better consumer safety features**. In addition, bio-based packaging materials can be made reusable or recyclable in applications that demand recyclability for a sustainable end-of-life. For other applications, bio-based packaging material that outperforms fossil-based alternatives can be made **biodegradable, industry- or home-compostable, or degradable** in specific environments if this feature is demanded. These features may be desirable for applications such as **food packaging**. If a packaging material contains food remains after use, it cannot always be recycled as part of recyclable plastic streams. Making packaging material for specific food applications compostable will allow it to be collected together with food waste and to be composted, thus diverting it from landfill or incineration.

The specific challenge is to upscale the production of sustainable and high-performing bio-based packaging solutions that do not create environmental damage during and after use.

SCOPE:

Produce innovative, high-performance bio-based packaging material with sustainable end-of-life properties **at demonstration level**, the performance of which is superior to fossil-based alternatives and to existing bio-based material such as paper.

Proposals must produce superior bio-based plastic solutions that are **biodegradable, industry-compostable, home-compostable or degradable in specific environments**. These solutions must be superior for a specific application that demands degradability/compostability as the best end-of-life option to prevent environmental damage. The targeted bio-based plastic solutions must be integrated in a **circular value chain** operating at demonstration level.

Proposals must therefore demonstrate and prove both:

- superior performance compared with fossil-based alternatives in comparable applications;
- a sustainable end-of-life causing no damage to the environment.

[1] COM (2018) 35 https://ec.europa.eu/environment/circular-economy/pdf/oxo-plastics.pdf

[2] Imogen E. Napper and Richard C. Thompson. 2019. *Environmental Deterioration of Biodegradable, Oxo-biodegradable, Compostable, and Conventional Plastic Carrier Bags in the Sea, Soil, and Open-Air Over a 3-Year Period.*

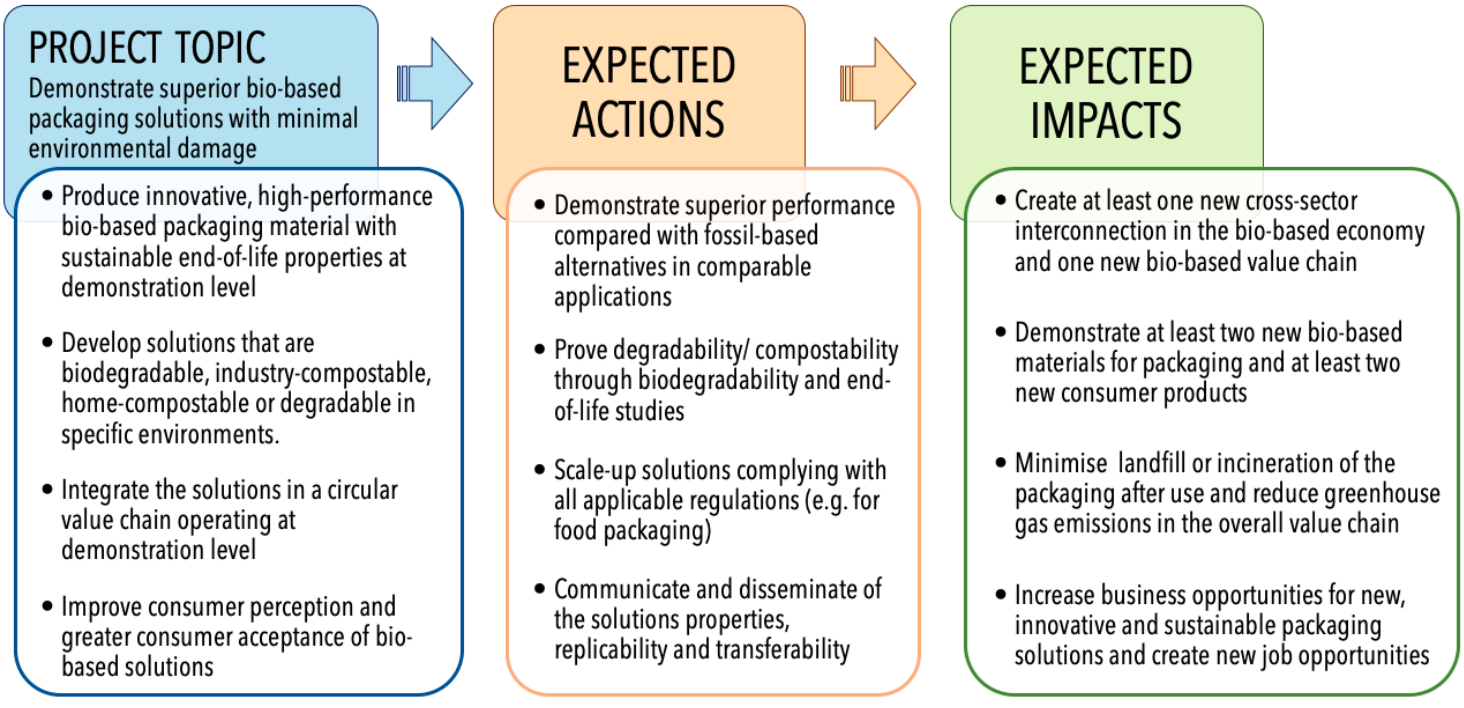
Achieving both these objectives will pave the way to improved consumer perception and greater consumer acceptance of bio-based solutions. The demanded proof **should meet accepted standards** for performance and degradability/compostability and the scaled-up solutions must **comply with all applicable regulations** (e.g. for food or cosmetics packaging), and with safety regulations in particular.

The **technology readiness level (TRL)** at the end of the project should be **6-7**. Proposals should clearly state the starting and end TRLs of the key technology or technologies targeted in the project.

EXPECTED IMPACTS:

LINKED TO BBI JU	• create at least one new **cross-sector** interconnection in the bio-based economy; • create at least one new bio-based **value chain**; • demonstrate at least two new bio-based **materials** for packaging; • demonstrate at least two new consumer **products** based on bio-based chemicals and materials that meet market requirements.
ENVIRONMENTAL	• **minimise landfill or incineration** of the packaging material after use; • reduce greenhouse gas (including CO_2) **emissions** (expressed in CO_2 equivalents) in the overall value chain compared with the state of the art; • contribute to the EU's 2050 long-term strategy for a climate-neutral Europe by replacing fossil-based material with bio-based, renewable material.
ECONOMIC	• lay the basis for **market-acceptable production costs** of the targeted bio-based products; • increase business opportunities for new, innovative and sustainable packaging solutions that have no negative impact on the environment.
SOCIAL	• create **new job opportunities** in the bio-based sector in rural, coastal and/or urban areas; • increase the competitiveness of European biomass producers and the bio-based industry by supporting new jobs, growth, and investment, while ensuring environmental sustainability and an increase in local biodiversity.

SUMMARY:



BUDGET

The maximum BBI JU contribution to address this specific challenge is of **€ 7 million.** Nonetheless, this does not preclude submission and selection of proposals requesting other amounts. Under the 2020 programme, the BBI-JU will finance **up to 70%** of the total eligible costs for **SMEs and large companies.** However, **additional in-kind contributions**, demonstrating the industrial investment and willingness to exploit the project's results, will be highly appreciated.

PROJECT CONCEPT

Although there has been a significant improvement in the **EU waste management** these past decades, one third of municipal waste is still landfilled and less than half is recycled or composted. Given the favourable regulatory context [3,4], considerable research has focused on the development of **bio-based and biodegradable packaging materials** as alternatives to fossil-based plastics. [5]

Among these, **Poly(lactic acid) (PLA)** represents the most widely used polymer for several applications, and is particularly relevant for **food packaging** considering its ease of processing, transparency, and low and non-toxic migration.[6,7] Compared to other biopolymers, the production of PLA has **many environmental benefits**, such as a 65% reduction in energy consumption, a 63% reduction in greenhouse gases and its ability to biodegrade.[8] However, several drawbacks still need to be addressed regarding its poor thermo-mechanical properties, low oxygen barrier performance, and hard to reach biodegradation conditions (60°C, more than 6 months).

The main challenge is to adapt this polymer to **meet the food packaging requirements**, *i.e.* maintain both food safety and quality of food products, and to **improve its biodegradability conditions**.

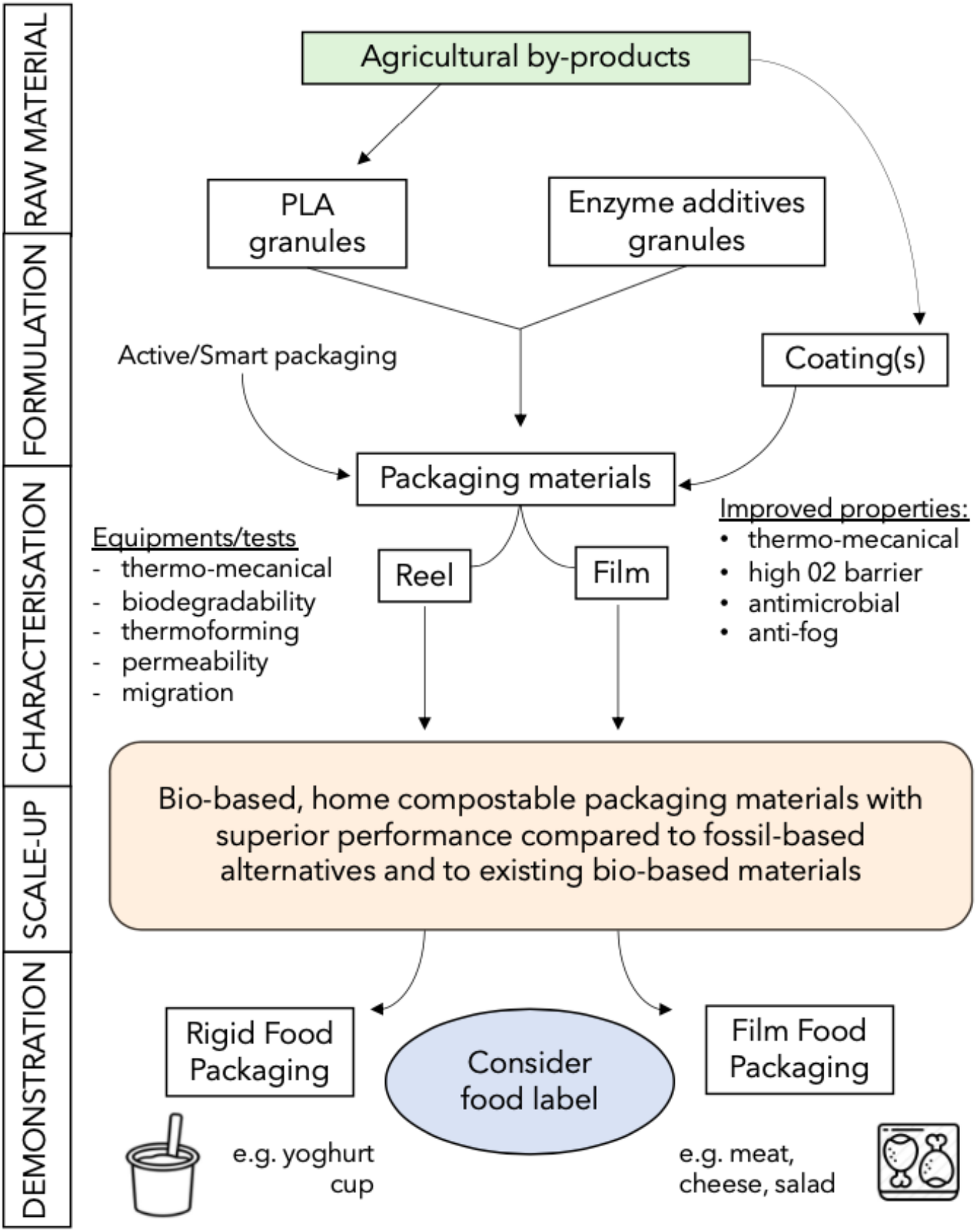
The present BBI project aims to develop **home-compostable PLA materials for intelligent food packaging applications**, by including:

- enzyme additives that will make PLA home-compostable,
- coatings improving thermo-mechanical, O2 barrier and antimicrobial properties, [9, 10, 11]
- active agents extending the shelf-life of packaged food products. [12,13]

At least **two** different materials leading to **rigid and flexible** food packaging will be demonstrated in operational environment (up to TRL7). For now, this project targets end applications for **fresh food products**, in order to extend their shelf life and try and reduce food waste, but other types of products can of course be included. The expected properties of these materials will be tailored to the selected applications.

Bringing this innovation to the pre-industrial scale within a EU collaborative project will enable to counter the lack of consultation between the diverse stakeholders throughout the whole packaging material life cycle and gather them around a **common innovation strategy**. [5]

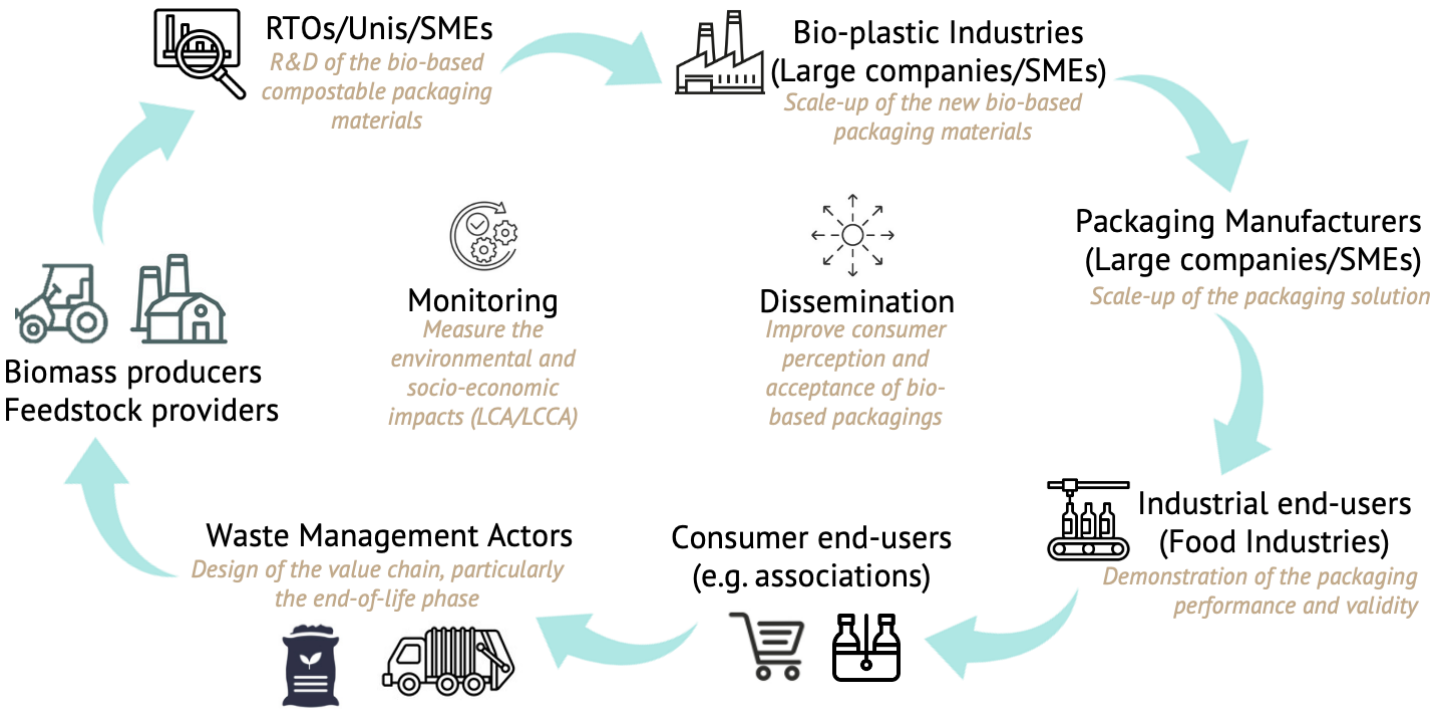
[3] EU Circular economy package, 2020
[4] EU Waste legislation, 2018
[5] V. Guillard et al. 2018. *The Next Generation of Sustainable Food Packaging to Preserve Our Environment in a Circular Economy Context*. Front Nutr.
[6] Ayse Tulin Oz et al. 2018. *Poly (Lactic Acid) Films in Food Packaging Systems*. Food Science and Nutrition Technology
[7] R. Auras et al. 2004. *An Overview of Polylactides as Packaging Materials.* Macromolecular Bioscience.
[8] M. Jamshidian et al. 2010. *Poly-Lactic Acid: Production, Applications, Nanocomposites, and Release Studies.*
[9] C. Rovera et al. 2020. *Nano-inspired oxygen barrier coatings for food packaging applications: An overview.*
[10] S. Farris et al. 2020. *Development of pectin–eugenol emulsion coatings for inhibition of Listeria on webbed-rind melons: a comparative study with fig and citrus pectins.*
[11] R. Gholami et al. 2017. *Shelf life extension of white mushrooms (Agaricus bisporus) by low temperatures conditioning, modified atmosphere, and nanocomposite packaging material.* Food Packaging and Shelf Life.
[12] A. Mahieu et al. 2015. *Thermoplastic starch films and thermoplastic starch/polycaprolactone blends with oxygen-scavenging properties: Influence of water content.* Industrial Crops and Products.
[13] S. Alix. 2013. *Active pseudo-multilayered films from polycaprolactone and starch based matrix for food-packaging applications.*



Project concept: home-compostable PLA materials for intelligent food packaging applications

PARTNERSHIP

The foreseen consortium would bring together approximately 10-12 partners coming from at least **3 different EU Member States**, gathering industries, research centres, universities, associations, and representing all the stakeholders of the newly created value chain.



The consortium currently gathers:

- a French research team specialised in the **valorisation of agroresources** to develop PLA polymers
- an Italian research team specialized in shelf-life extension, food safety and **coatings** improving PLA performance
- a French SME providing **enzymes** accelerating PLA biodegradation
- a Spanish research centre specialised in **interactions** between the food product and the packaging material.

As an end-user from the food sector, your role would be to **demonstrate** the validity of the packaging prototypes in your current processes and applications.

SETTING UP OF THE PROJECT BY EUROQUALITY

Euroquality is a consultancy company established in France and working since 1997 on innovative European projects set-up. With more than 20 years of experience in various European programmes (FP7, Horizon 2020, LIFE, Erasmus+, BBI, *etc.*), we are specialised in defining and managing international collaborative projects funded by the European Commission.

Euroquality will be responsible for building-up the entire proposal, first by performing preparatory work, which covers preliminary discussions on the project concept and consortium composition and partner search, and then by preparing templates to collect technical, financial and administrative information from the consortium members. Euroquality will then work in cooperation with the consortium to co-write the proposal.

PHASE 1 Building the consortium

1.1: Analysis of the call and definition of the main requirements of the European Commission
1.2: Technical and economical studies
1.3: Potential partners identification and discussions

PHASE 2 Managing the proposal set up

2.1: - Definition of the work to be performed during the project i.e. Work Plan
- Definition of the leaderships and tasks
- Definition of exploitation, communication and business strategies
2.2: Draft of budgets – individual and global

PHASE 3 Proposal writing

3.1: Technical forms:
→ Sections 1, 2, 3
3.2: Financial form: budget
3.3: Administrative forms:
→ Sections 4, 5, 6

Fees for our services

In the framework of this project, the services provided by Euroquality will be funded through a participation of each partner according to the following rules:

- A fixed fee before the submission of the project: €5,000 (without taxes)
- A success fee subsequent to project approval: 1% of the partner's share of the EU contribution

Do not hesitate to contact us for more information.

Contacts

If you are interested in joining this project or if you need more information, feel free to contact us:

Juliette Soudon

Environment & Sustainable development

✉: juliette.soudon@euroquality.fr

Pierre Rossignol

Environment & Sustainable development Unit

Innovation Consultant & Project Manager

✉: pierre.rossignol@euroquality.fr

Barthélémy Maillard

Head of the Environment & Sustainable development Unit

Innovation Consultant & Project Manager

✉: barthélémy.maillard@euroquality.fr