Bioplastics/ By-products
First of all, a bit of vocabulary:

**Circular economy**

Circular economy is an economical model that produces **sustainable** goods and services, **limiting the consumption and waste of resources** (raw material, water, energy) as well as the production of waste. The goal is to **break the linear model** (extract, produce, consume, throw away) and replace it with an economical “circular” model.

**By-products**

A by-product is an intentional and inevitable material created during the same production process as the main product. For the manufacturers, the valorization of waste and by-products is a **major environmental and economical spreading issue**. Those by-products and the vegetable fibers come from French territory. The goal is to incorporate this material in various polymers in order to work on the concept of circular economy and waste valorization. **For ex.** Rice hulls coming from food industry waste.

**Bioplastics**

The term “bioplastic” refers to two types of material. On one hand, **biobased plastic materials** (made from vegetal resources) and, on the other hand, **biodegradable plastic materials**, including compostable ones.
Who are we?

Expert in the field of plastics made from renewable resources and biodegradable; since 2007, with its R&D center BiopolyNov, accompany manufacturers in the development of new valorization ways of their by-products in the plastic industry.

By-products are processed by the R&D center, where they are going through different preparation steps: drying, grinding, micronization and sieving. The material is thus valorized in plastic industry (development of compounds and transformation by injection or extrusion). BiopolyNov is equipped with processing equipments and a characterization lab.
What do we do?

Circular Economy

- Bioplastic raw material: The only European supplier of all bioplastic produced over the world.

Trainings and market studies

- Acquire the fundamentals of bioplastics, their technical properties, their advantages and their limits.
- Development of customized formulations: Improving and optimizing properties of an existing bioplastic in order to adapt it to given specifications.
- Valorization of by-products: Development of formulations containing a specific by-product mixed with a plastic or a bioplastic.

Bioplastic compounds: Production of customized compounds.

Fibers and by-products biocomposites: Production of compounds using vegetal fibers or by-products from French industries.
Our development approach:

By-product selection

- Cereal
- Seashell
- Fruits
- ...

Processing

- Drying
- Grinding
- Micronization
- Sieving

Definition of incorporation percentage and particle size.

Biodegradable or not

Virgin or recycled

Conventional Plastic

Biobased Plastic

New pellets of bioplastic

New products

- Packaging
- Transport
- Sport and hobbies
- Paper industry
- Medical
- Luxury ...

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- Transport
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- Paper industry
- Medical
- Luxury ...
What is the interest of producing plastics with by-products?

- Focusing on the circular economy

1. By-products from scallop farming
2. Shell recovery on NaturePlast site
3. Processing (grinding, sieving)
4. Development of a formulation
5. Production of a new compound
6. Production of fish container

Ecological advantage
A new sensory experience
What is the interest of producing plastics with by-products?

• A conclusive lifecycle analysis

We have requested O2M Conseil to compare the environmental performance of our different by-products and matrices.

The use of by-products coming from agricultural activities represents a way of eco-conception. It allows to improve in all cases the environmental performance of biocomposites in terms of greenhouse gas emissions and consumption of oil-based energy.

Certain points, concerning biomass production (aquatic eutrophication and air acidification) or its treatment (drying) still need to be improved.

What’s a LCA?

Compilation and evaluation of incomings (water, raw materials...) and outgoings (solid or liquid wastes...), as well as the potential environmental impacts of a product system during its lifecycle. (ISO 14040)

ISO - The International Organisation of Standardization

In comparison with a 100% fossil-based solution:

15 to 20% 50 to 60%

Of environmental benefit in the case of introduction of a by-product into a fossil-based polymer.

Of environmental benefit in the case of introduction of a by-product into a biobased polymer.

An ecological advantage

A new sensory experience
What is the interest of producing plastics with by-products?

1. **What we can see:**
   - Amount and size of the particles, colors, translucency...

2. **What we can smell:**
   - Coffee, flower, fruit...

3. **What we can touch:**
   - Smooth, soft or slightly rough texture.

4. **Idea association:**
   - An original and unique material that can, in some cases, remind other types of materials (marble, ivory, sandstone, ebony...).

**An ecological advantage**

**A new sensory experience**
What is the interest of producing plastics with by-products?

1. The incorporation rate of the particles
2. Colors of the material depending on the processing temperature
3. Size of the particles
4. The unique nature of the part
5. Colors of the materials using coloring agents

An ecological advantage

A new sensory experience
What is the interest of producing plastics with by-products?

- Coloring of fiber and by-product based compounds

**Wheat**
- 2% blue, 1% blue
- 1% red, 1% yellow
- 2% green, 3% white

**Oyster**
- 2% blue, 2% green
- 2% red, 2% yellow
- 2% white

**Flax**
- 2% blue, 1% blue
- 2% green, 2% white
- 1% red, 2% yellow

An ecological advantage

A new sensory experience
What is the interest of producing plastics with by-products?

1. Smells coming from by-products incorporated into the matrix.
2. The smell intensity can be adjusted depending on the by-product.
3. Packagings and parts with olfactory properties.

An ecological advantage

A new sensory experience
What is the interest of producing plastics with by-products?

1. **Rigidity or flexibility** of the material depending on the matrix used.

2. **Softness or roughness** of the material depending on the filler.

An ecological advantage

A new sensory experience
What is the interest of producing plastics with by-products?

- Sandstone, pebbles effect
- Coconut effect
- Pink marble effect
- Ivory effect
- Ebony effect

An ecological advantage

A new sensory experience
The main by-product ranges:

This list is not exhaustive, it is possible in some cases to identify and to use new type of by-products, defined according to a precise need.

- Marine spirit
- Meadow spirit
- Fruit spirit
- Vegetal fiber spirit
- Floral spirit
- Textile spirit

Your project
By-products range: marine spirit

- Oyster: Originating from shellfish aquaculture
- Mussel: Originating from shellfish aquaculture
- Scallop: Originating from shellfish aquaculture
- Algae: Originating from aquaculture and valorization
By-products range: meadow spirit

- Wheat
- Barley
- Rice hull

Cereal and seed waste
Cereal and seed waste
Food industry by-product
By-product range: fruit spirit

- Cocoa
  - Chocolate industry by-product

- Grape seed
  - Winemaking industry by-product

- Olive stone
  - Agriculture by-product

- Coffee grounds
  - Restaurants and coffee houses by-product
By-product range: vegetal fiber spirit

- Wood
- Cork
- Miscanthus
- Flax

Sawmill by-product
Capping activity by-products
Miscanthus transformation by-product
Flax transformation by-product
Range of by-products: floral spirit

- Lavender
- Rose

Coming soon

Sorting waste from flower industry

Sorting waste from flower industry
Range of by-products: textile spirit
It is possible, in some cases, to identify and to use new types of by-products, defined according to a precise need, and to develop a customized formulation according to your specifications.
Potential applications:

**Activity sectors**
- Packaging
- Transport
- Sport and hobbies
- Paper industry
- Medical
- Luxury products
- Cosmetics
- ...  

**Processes**
- Injection
- Extrusion
- Blowing
- Thermoforming
- Rotomolding

30% scallops + white

30% Flax
25% Oyster
Coffee grounds

Wheat
Wheat
Oyster
Cork
Coffee grounds
Wheat

Olive stone
Contact us and we’ll innovate together by integrating biocomposites in your strategy!