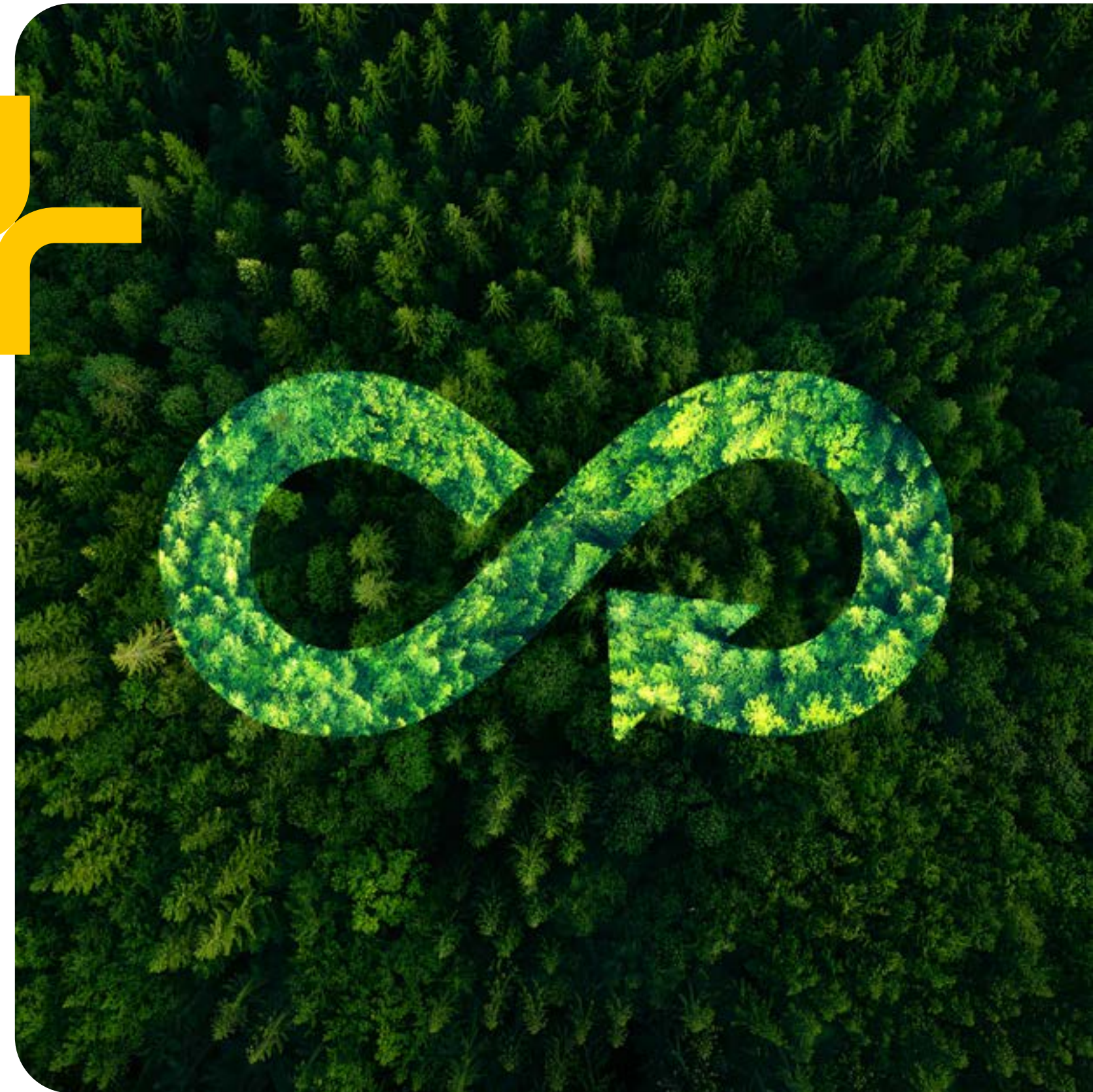
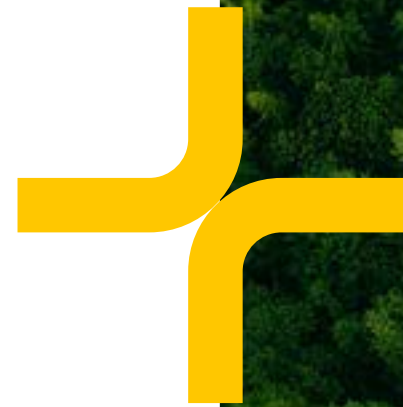


Catalogue of Innovative Solutions and Good Practices that contribute to the transition towards a Circular Economy

Date of publication: March 2026

This document is a deliverable of the ORHI+ Project (Interreg-POCTEFA Programme), the result of collaborative work between different project partners:





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The ORHI+ project as a whole integrates different lines of work or actions. These include the following:



Action 3

Activity 1

Development of an **eco-innovation methodology** and a **support tool** to integrate Circular Economy and social criteria into new projects.



Action 4

Promotion of **7 interregional Demonstration Projects** linked to the 4 thematic axes of ORHI+.



Action 3

Activity 2

Preparation of a study to **incorporate Circular Economy principles** into **Public Procurement processes**.



Action 5

Support for companies through financial aid, technical assistance, and business missions to develop Circular Economy initiatives.



Action 3

Activity 3

Thematic and International monitoring aimed at developing a **Catalogue of Innovative Solutions and Good Practices** that contribute to the evolution of the Circular Economy in the 4 thematic axes of the project.



Action 2

Communication and dissemination of the project, facilitating stakeholder participation and knowledge transfer to the business and social ecosystem.

This document constitutes the deliverable for the **Catalogue of Innovative Solutions and Good Practices** identified in the **Thematic and International Monitoring Activity (Action 3, Activity 3)**. In turn, it is a valuable tool for disseminating these solutions among the business and social network, both within the ORHI+ territories and beyond, at both national and international level (Action 2).

Purpose of the catalogue

The ORHI+ project arose from the motivation of several entities that had previously worked together on the European ORHI project to continue joining forces in the service of **the evolution of economic activity** in our territories towards the **Circular Economy**.

In the ORHI project previously carried out in the period 2018-2021, we proposed the identification of innovative solutions at national and international level, so that we could then accompany local companies in the implementation of these solutions. Beyond the achievements we were able to accomplish, we realised that carrying out this process of *identifying benchmark solutions, *disseminating them throughout the business community and *supporting local companies in their implementation involved work that could hardly be completed within the three-year timeframe of a POCTEFA project.

Therefore, when several of ORHI's partner entities decided to design ORHI+ to continue joining forces in the service of the Circular Economy, we were clear that it was important to start from the beginning with specific "demonstration projects" linked to specific realities/problems and with the collaboration of specific companies. In this way, the three-year period could facilitate a greater scope in the results achieved (and to be disseminated) that add value to the POCTEFA territory.

Thus, as described in Action 4 of the ORHI+ project, a total of **7 Demonstration Projects** were launched at the same time as the ORHI+ project began in January 2024.

These demonstration projects were classified into **4 thematic axis** that were "areas of shared interest" for the different territories involved in ORHI+: the Basque Country, La Rioja and the Atlantic Pyrenees.

Although each project had identified objectives, a work plan and expected results, we felt it was important to enrich the development of these projects, as well as the interest in these topics by various companies and institutions in the different territories, adding to the project development work a specific **Thematic and International Monitoring** task that would allow us to identify, for each of the four thematic areas of the project, Innovative Solutions and Good Practices that could either be applied to/connected with the demonstration projects already underway or could be the seed for new projects.

That is why **6 ORHI+ partner organisations** have taken on the responsibility of proactively seeking, at national and international level, **Innovative Solutions and Good Practices** in the **4 thematic axis** mentioned above in the ORHI+ project.

- **Axis 1: Valorisation of agri-food by-products**
- **Axis 2: Development of biomaterials/bioproducts**
- **Axis 3: Plastic life cycle**
- **Axis 4: Process optimisation**



Target audience and benefits

This catalogue is aimed at Companies and Public Entities

● Types of Companies it is aimed at and the value they can find:

Companies that generate agri-food by-products they can find references elsewhere that increase the market value of their own by-products as a source of inspiration to implement them in their own activity, either to open up new marketing opportunities on their own or in collaboration with other entities that generate such by-products (**inspiration to replicate**) (**references of possible partner companies**).

Companies interested in developing biomaterials from their resources they can find existing references elsewhere on the use of biological resources for the manufacture of biomaterials that replace fossil-based materials (**inspiration for replication**) (**references of possible partner companies**).

Companies interested in incorporating biomaterials into their own activities can find existing references for suppliers of bio-based materials that replace fossil-based materials (**reference for suppliers**) they can find existing references for engineering suppliers specialising in bio-based materials that can help them in their processes of incorporating bio-based materials and reducing their carbon footprint (**references for suppliers**).

Companies interested in recovering value from their plastic waste can find existing references for technologies that increase efficiency and recovery in the processing of their plastic resources (**supplier references**) can find existing references for companies that use their plastic waste resources to generate products of value in the market (**customer/partner references**).



Companies interested in starting a business in the plastic recovery sector can find existing references of companies that recover waste plastics to generate valuable products on the market (**inspiration to replicate**) (**references of potential partner companies**).

Companies seeking innovative technologies to optimise their processes in line with the Circular Economy principles can find existing technologies with proven commercial success that optimise production processes while contributing to the evolution towards the Circular Economy (**supplier references**).

Companies interested in venturing into new sectors of activity in line with the Circular Economy can find existing references of companies offering solutions aimed at optimising processes in line with the Circular Economy (**references of potential partner companies**).

● Types of Public Entities targeted and the value they can find:

Local/regional public entities interested in promoting the Circular Economy in their region can find references to experiences that other public entities are successfully implementing in order to promote the circular economy in their territories (**inspiration for replication**) (**references to potential partner companies**) they can find references of interest to disseminate within their local business community (**references to disseminate**).

Axis 1: Valorisation of agri-food by-products

● Innovative Solutions

Source

1	NFP-OUATBOX	France	OuatBox is an innovative, high-end cushioning solution for logistics made from fibre assemblies (such as cotton, wool, linen and hemp).	CCIBPB
2	TRAILLE-PUXKA	France	Traille is a French company that recycles unused wool (especially from Manech and Basque-Béarnaise sheep) to manufacture innovative natural materials.	ESTIA
3	ALEGINA-VIVAÔ	France	Permeable paving stones made from crushed oyster shells and a binder (decarbonised cement) that allow water to infiltrate, eliminate runoff and combat urban heat islands by cooling the ground.	ESTIA
4	WETTERBIOTECH	France	Company that uses agri-food waste to produce natural inputs, manufactured locally in the French Basque Country (64).	ESTIA
5	INTZA-ONA COSMEHTIK	France	Valorisation of whey to manufacture hygiene and beauty products under the Ona Cosmehtik brand.	ESTIA
6	TERRA BIOINDUSTRIES	Canada	Company with an upcycling platform that extracts different ingredients from beer bagasse and other agri-food co-products.	SAIOLAN
7	SILVIBIO	UK	SilviBio develops peat-free growing media from locally sourced materials.	ADER

● Good Practices

8	WOOLLY POT (BIOREGION INSTITUTE)	Norway	Woolly Pot is a project led by the Norwegian start-up Invertapro, based in Bergen, which specialises in circular innovation. It develops solutions based on unused organic material, such as sheep's wool, to meet agricultural and environmental needs. The activity combines waste recovery, eco-design and the reduction of single-use plastics.	CCIBPB
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1

NFP
OUATBOX

Founded in 2019
Headquarters in Labastide-Cezeracq (64)
Staff of 7 employees

What does it do
Valorization of agricultural by-products. Plastic Life Cycle (Substitute).
Recycling of textile materials (natural fibres).

Activity	NFP offers innovative solutions based on textile, recycled or agro-sourced fibres. The site has a manufacturing line for textile fiber blends and brings various functionalities to these fiber assemblies. With a production capacity of 5,000 T/year, NFP can work under its own brand as well as on a contract basis for its customers. It has a large series cutting line, a technical fraying line and a packaging line that allows the fibers to be bagged while compressing them to limit transport volumes.
Product/ Service	OuatBox, an innovative high-end sensory cushioning solution for logistics: fibre assemblies (such as cotton, wool, linen and hemp) offering an economical cushioning method, made in France and labelled 100% recycled and recyclable. Bag with a capacity of 2 m³ expanded with material (about 10 kg). Size of a bag (compressed material): 40x40x80 cm. Properties: Lightweight material: approx. 5 kg/m³. / Controlled assembly. / Maximum resilience. / Shape memory wadding. / Thermal protection properties. / Manages humidity by hygroscopy. Does not produce static electricity. / Absorbs shocks. / Customizable: possibility of coloring in a natural way and/or perfuming with organic essential oils. The company plans to license this innovative solution around the world.
Price	Among the cheapest on the market (about 40 to 45 % less expensive than kraft paper): 1 bag (10 kg) can handle 1,500 parcels (300x200x50 mm) filled to 40 % cushioning.
Differential value	A more ecological alternative to kraft paper and much less expensive, with a price differential of between 30 and 45 %. Wadding is an excellent shock absorber. It is very light, can protect the product from temperature variations. Alternatives to kraft paper, polyester chips, bubble wrap and other environmentally friendly alternatives. Ouatbox won the 2022 Oscar for Packaging in the Industrial Packaging category.
Market/ Target audience	Brands such as Raja, major internationally recognized luxury haute couture brands, and SMEs in wine and food are among its customers. Retailers with an online store, the biggest e-commerce brands operating internationally. Companies and merchants who need to package their products with an eco-responsible and 2.0 cushioning, with very good technical characteristics. The business model of this company is only B2B (aimed at companies that send parcels). The product can be reused by the customer. If it has to be thrown away, it is textile waste.
Technology/ Process	Process steps: Automatic mixing of fibers according to precise specifications. Fibre working. Standardization of the material. Fiber Dust Removal. Bagging and packaging.

OuatBox



2

TRAILLE
PUXKA

Founded in 2019
Headquarters in Biarritz (64)
Staff of 2 employees

What does it do
Valorization of agricultural by-products. Plastic Life Cycle (Substitute).
Recycling of textile materials (natural fibres). Improved soil health.

Activity	Traille is a French company that recycles unused wool (particularly from Manech and Basque-Béarnaise sheep) to make innovative natural materials. Among its products: wadding, down jacket, mulch, technical textile. It seeks to offer natural alternatives to synthetic materials, with local production, transparency and traceability.
Product/ Service	The mulch offered by Traille is made from Manech and Basque-Béarnaise sheep's wool, washed in the north of Spain, then processed in Nouvelle-Aquitaine. It is 100 % biodegradable, and serves as a local alternative to plastic sheeting or woven canvas for weed management. Among the properties offered by wool: water retention, nutrient intakes, temperature regulation, 100 % biodegradability, repulsion of gastropods...
Price	Roll of 3m x 1m in 500 g/m² (retail price: 27€/roll). In B2B, the price will depend on the quantities and frequency of orders.
Differential value	Local product made from local sheep's wool (maneche, Basque-Béarnaise) with the recovery of a little-used by-product. Full biodegradability , unlike plastic sheeting. Multifunctional effect : retains water, provides nutrients, regulates temperature, reduces the use of plastics. Traceable and transparent production.
Market/ Target audience	Professionals in green spaces, agriculture, agroforestry looking for sustainable alternatives. Gardeners , local authorities, farms, park or garden management.
Technology/ Process	Process steps : Shearing and sorting of ewes. Washing the wool. Carding. Needle felting. Bagging and packaging.



4

WETTER
BIOTECH

Founded in 2023
Headquarters in Pépinière d'entreprise HABIA, 561 ZA Errobi Alzuyeta, Itxassou
Staff of 4 employees

What does it do
Valorisation of agricultural co-products (brewer's yeast, hops, lactic acid, etc.), natural substitutes for pesticides and chemical inputs.

Activity

WetterBiotech is a start-up specialising in green biotechnology and green chemistry, developing bio-based solutions for agriculture, livestock farming and cosmetics. It recycles agri-food bio-waste to produce natural inputs, manufactured locally in the Basque Country (64).
Biosolutions to protect crops: biosolutions, biocontrol products, biostimulants and copper adjuvants designed for biological protection and treatment of vines, field crops, wheat, rapeseed, corn, market gardening and arboriculture. Improving phytosanitary treatments, replacing CMR pesticides, targeted action on diseases, pathogens and pests, limiting resistance to antibiotics and synthetic active substances.
Biosecurity solutions to prevent livestock diseases: these address the health challenges faced by livestock farms (sheep, cattle, goats and mixed) and help prevent infectious diseases, reduce mortality and strengthen animals' natural immunity, while promoting good farming practices and avoiding antibiotic resistance.
Cosmetics and nutraceuticals: production of active ingredients under optimal conditions thanks to patented technology combining green chemistry and biotechnology. The various ingredients (plant extracts, yeast, lactic acid, whey, hyaluronic acid, etc.) are recognised for their nutritional and functional properties, backed by numerous studies.

Product/Service WetterBiotech offers a range of products and biosolutions, including: Feed and animal feed preservatives; biosecurity solutions and probiotics; crop defence biostimulants. Manufacturing process patented in Europe since 2024.

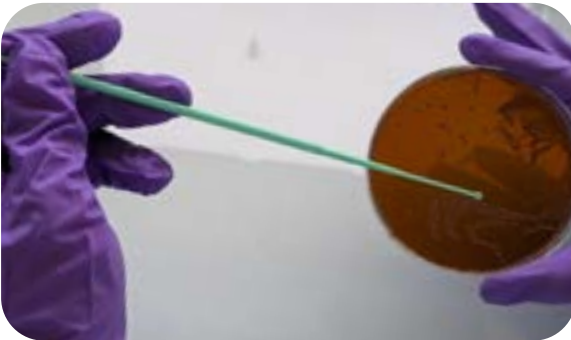
Price For products in the livestock and crop ranges, prices range from €2 to €12 per litre depending on the format and function of the product.

Differential value Technology patented in France (2023) and Europe (2024). Products that are 10 0% natural, free from harmful synthetic materials, and suitable for conventional and organic farming. Recycling of agri-food bio-waste using patented technology to produce useful inputs. Contribution to regenerative agriculture by replacing or reducing chemical inputs. Multi-sector solutions (plants, livestock, cosmetics) integrating circularity. Local approach/short supply chains to reduce transport and strengthen regional economies: all raw materials are upcycled and sourced within 50 km of the processing laboratory (Itxassou).

Market/Target audience Farmers (field crops, market gardening, viticulture, arboriculture). Livestock farmers (cattle, sheep, goats, poultry). Agri-food manufacturers wishing to recycle their waste. Cosmetics and nutraceutical companies seeking natural and bio-based ingredients.

Technology/Process Fermentation (biotechnology) and green chemistry applied to organic co-products. Recycling of bio-waste to produce agricultural inputs. Patented process for converting local organic resources into natural active solutions. Collaboration with research institutes (INRAE, IFV, etc.) and local agricultural stakeholders to develop and test solutions.

OuatBox



Axis 2: Development of biomaterials/bioproducts

● Innovative Solutions

Source

1	COMPETITIVE GREEN TECHNOLOGIES	Spain	Production of bioresins from organic by-products, mainly for (1) the automotive sector and (2) the packaging sector (100 % compostable food packaging).	SAIOLAN
2	BIORGANI	Guatemala	Development of high-quality, environmentally friendly, internationally certified and competitively priced biopolymers that can be used to replace PP and PE.	SAIOLAN
3	LIGNUM	South Korea	Company that develops biofillers from forest by-products mainly used in automotive interior components.	SAIOLAN
4	KUORI	Switzerland	Development and production of bio-based and biodegradable polymers for outdoor, fashion, sports, automotive and other plastic applications, based on biofillers derived from food industry by-products.	ADER
5	RESICARE	France	Development and marketing of bio-based, 100 % non-toxic, high-performance thermosetting adhesive resin for industrial applications.	ESTIA
6	REVIVE	UK	Revive Eco converts used coffee grounds into sustainable bio-oils for the cosmetics and chemical industries.	ADER
7	TXIRBIL	Spain	Company that develops advanced biocomposites, transforming products and manufacturing processes to the circular economy. 100 % biological, high-performance products and processes.	ESTIA
8	AERBOARD	France	Development of products based on the reuse of cardboard, which is transformed into composite material (with the addition of fibre and resin).	ESTIA

● Good Practices

9	SAMOROST	Czech Republic	A collaborative initiative between a company, a university and a financial institution aimed at exploring and developing the potential of mycelium as a “biomaterial” for various applications in construction.	SAIOLAN
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2 BIORGANI



Founded in 2016
Headquarters in Guatemala
Staff of 25 employees

What does it do
Company **developing bioresins** applied to food and non-food packaging.



Activity	Development of quality, environmentally friendly, internationally certified and competitively priced biopolymers that can be used: To fully replace conventional plastics (PE and PP) - so that in addition to reducing the carbon footprint, a 100 % compostable product is achieved. To “partially” replace conventional plastics (PE and PP) - thus reducing the carbon footprint, but not achieving a compostable product.
Product/Service	They use the by-product of corn cultivation as raw material. Biological and compostable resins: Film Grade: FAUNNUS Bio Based Resin and SOLUM Compost Resin. Thermoformed Grade: TERRA Bio Based Resin and TERRA Compost Resin. Injection Grade: LUNAM Bio Based Resin and LUNAM PLUS Compost Resin. They cannot offer a transparent material.
Price	Bioresin Price is around 2,000 - 2,400 U\$D/Tn for at least one container. For orders from 200 Tn/month, the price is usually revised. The price is between 5 % and 15 % more expensive than conventional plastic (taking into account the advantages of lower energy consumption due to the need for lower process temperature, between 5-10 %).
Differential value	Bio-based resins used in conventional plastics processing equipment. Bio-based resins require lower temperatures in the production process, resulting in energy savings and a lower carbon footprint for manufacturers. It is easy to mix and process. If the client company does not want to switch to a 100 % bio-based product, it can also use BIORGANI's bio-resins as a “filler” to be added to its conventional plastics (PE and PP) - with mixtures ranging from 20 % to 50 % with polyethylene (PE) and polypropylene (PP). Can be mixed with conventional inks.
Market/Target audience	It has offices in Guatemala, Chicago, Hong Kong and Panama. Bioresins can be used for the production of detergent packaging, fresh food trays, shrink films, lids... Bioresins are valid for manufacturing processes by extrusion (food packaging, mulch films, rubbish bags and any flexible continuous plastic), thermoforming (trays, cups, plates, food packaging and any product that requires moulding in sheets), injection moulding (cutlery, reusable containers, bottles and any product that requires injection moulding) and extrusion blow moulding (bottles). They are working with major clients such as NESTLE. Typically their customers use blends of 50 % bioresin and 50 % PE or PP. They currently manufacture 1,200 tonnes per month. The company is open to supplying its bioresins to Europe in a supplier-customer relationship with local companies. Likewise, they are also open to collaborate with companies interested in becoming distributors of their product. For this, the ideal company (partner) is “a resin producing company that wants to increase its catalogue” or “a resin distributing company”.
Technology/Proces	Technology originated at the University of Shanghai. New formulations are developed in Guatemala. Manufacturing is mainly done in China and they also have a small production in Guatemala and from there they are available to serve the USA, Central America, Mexico, the Caribbean and Colombia.



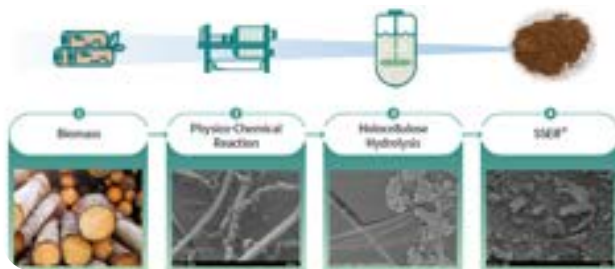
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LIGNUM

Founded in 2017
Headquarters in Yuseong
Staff of 5 employees

What does it do
Company that **develops biofillers** mainly for automotive interior components.

Activity	Company that develops biofillers from forestry byproducts (currently pine sawdust) mainly applied to automotive interior components. They mention the applicability of the material to other sectors, although the company seems to specialise in automotive.
Product/Service	In their industrial process, which starts from forest biomass, they obtain 2 products: Biofiller : Made from lignin, it can replace conventional fillers such as talc and calcium carbonate as well as UV stabilisers. It can be applied to plastic and rubber components in car interiors (e.g. bumpers, door trims, tailgates...). The substitution is not 1 to 1, the formulation has to be adapted in each case. It cannot replace fiberglass because it does not provide sufficient mechanical properties. Bio-sugar : Applied for industrial bio-fermentation processes with microorganisms by chemical companies (e.g. manufacturers of bioethanol and other biochemical products). In terms of production in its process, biofiller represents 60 % and bio-sugar 40 %. In terms of revenue, biofiller is twice as much as bio-sugar.
Price	The price of the biofiller is approximately 2 USD / kg.
Differential value	Lightweight: The biofiller can replace talc so that it reduces the weight of the component. Carbon footprint reduction: The LCA is - 1.5 kg CO ₂ eq./kg at its factory in South Korea. Variety of colours: Components do not have to be black. Lignin has a dark brown colour. With titanium dioxide they can achieve several colours, especially in rubber. It can be used as a filler in both PP and rubber.
Market/Target audience	Its customers are both plastic and rubber compounders. The involvement of the components manufacturer (TIER1) and the OEM in the project is important when validating the material for an automotive part. Currently SSANGYONG MOTOR is already using the biofiller in the Tivoli model. LIGNUM supplies them with a small quantity, 1 Tn/year (as their manufacturing capacity is small, only several thousand cars/year). LIGNUM is contacting other OEMs for making tests: VW, FORD (at its supplier MAGNA) and HYUNDAI (HYUNDAI is interested in testing rubber applications in interior parts and bumpers). The Spanish company GRUPO ANTOLIN is testing Lignum's material with polypropylene (PP) through its compounder WASHINGTON PENN at its plant in Slovakia for a VW part. He also mentions that they are focusing a lot on the Japanese market as they have received interest from Japanese companies in testing the material as a biofiller for rubber. SUMITOMO RUBBER INDUSTRIES is testing the material. They show openness to collaborate with European companies in supplier-customer relationships. They are open to send samples to companies interested in their solutions (shipping costs will be borne by the client company). In the future, they might also consider licensing their technology to set up a production plant in Europe. Not right now: they currently have a pilot plant and they are focused on their own industrial scale-up process.
Technology/Process	They have an innovative technology that converts lignocellulosic biomass into SSEIF® Biofiller through two basic processes: (1) a physico-chemical reaction and (2) a hemicellulose hydrolysis process. The production plant is located in South Korea. They currently have a production capacity of 300 Tn/year and they foresee to scale up to 3,000 Tn/year by 2027. For the 3,000 Tn/year plant, an investment of around 10 million USD is needed.



The lightweight tailgate, which includes the Lignum biofiller, has already been applied to Ssangyong Motor's TIVOLI vehicles since September 2019



5

MICHELIN RESICARE
(ARAMINOLIC RESIN)

Founded in 2016
Headquarters in Clermont Ferrand (63)
Staff of 50 employees

What does it do
Company that develops bio-based and non-toxic resins for various applications.

MICHELIN
RESICARE

Activity	Development of thermoset resin 100 % non toxic, biobased and high performance dedicated to industrial applications. After a proven development for the textile reinforcement of tyres (millions of tyres have been produced with this resin), Resicare's ambition is now to offer and adapt its Araminol Resin to 7 priority applications (see below). Resicare develops tailor-made polymer materials and facilitates their integration into industrial processes: Resin design: specific resin for each product, with formulation adapted to customer needs, tailor-made resin based on formulation models. Plug & Play solution: no need for new equipment. Technical support: sharing of results with the company's chemists.
Product/Service	Biobased, non-toxic resin for 7 versatile applications: INDUSTRY (semi-finished): prepregs for composite materials . TRANSPORTATION: dipped fabric and brake pads . CONSTRUCTION: plywood, MDF and insulation . SPACE & DEFENSE: ablative protection .
Price	> 8€/ kg.
Differential value	Biobased main molecules (monomers), non-fossil origin, derived from fructose → plant production in France starting in 2027. No toxicity: no CRM (Carcinogenic, Reprotoxic, Mutagenic / No SVHC (Substances of Very High Concern) criteria = No formaldehyde, No phenol, No resorcinol... Excellent thermal and flame resistance = certification FAR 25 (with glass fiber).
Market/Target audience	Manufacturers who are currently using thermoset resin in their process (phenolic resin for example) and looking for more sustainable solutions / to produce more sustainably. Worldwide with Europe focus.
Technology/Process	Hot polymerisation. Thermocompression. Autoclave. Impregnation. Infusion...



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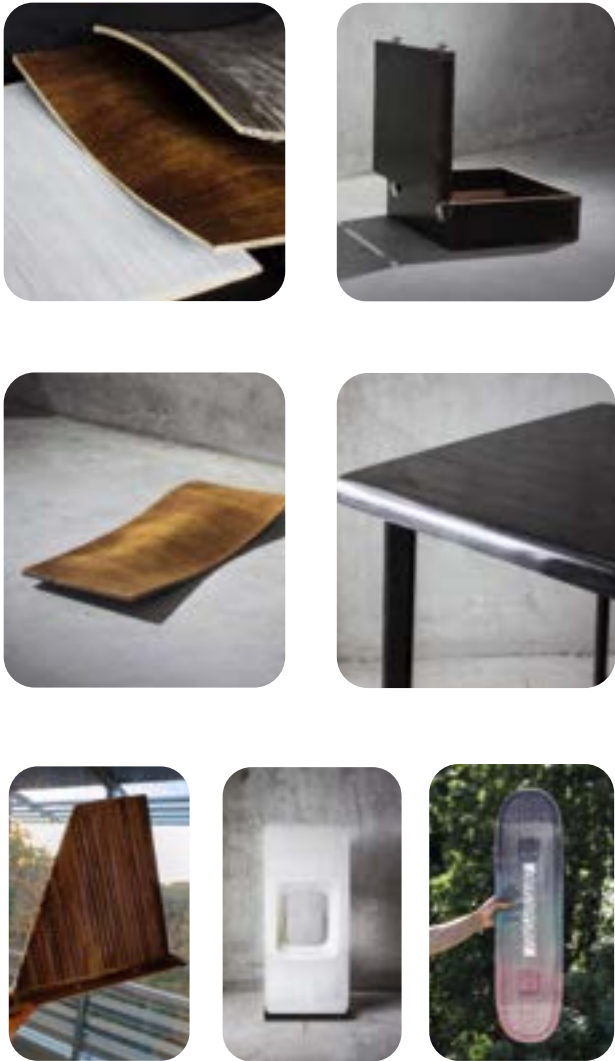
AER
BOARD

Founded in 2022
Headquarters in Pépinière Technocité, Bayonne
Staff of 4 employees

What does it do
Development of products based on the reuse of cardboard, which is transformed into composite material (with added fibre+resin).



Activity	AERBORD offers products and materials made from recycled materials. Since 2022, Trashboard has been offering skateboards made from reused cardboard and other composite materials such as carbon fibre from the aerospace industry. The company recently changed its name and is now called AERBOARD. AERBOARD offers a lightweight and ultra-resistant composite material made from cardboard collected within 10 km, a material with many virtues, whether in finished or semi-finished form. This composite material is suitable for many sectors and applications: aeronautics, sports, furniture, POS advertising and even luxury sector.
Product/Service	Aerboard offers the following options: *Finished product: Aerboard studies the potential customer's request and offers to manufacture the product directly using its own production facilities. *Semi-finished product: Aerboard offers a range of products ready to be implemented using the manufacturer's own facilities. *Design: Aerboard supports its customers in the design and manufacture of product-specific production resources (moulds, tools, etc.).
Price	Skateboard range: between 69€ and 459€ depending on the model and level of equipment. Specific product studies available on request.
Differential value	Low carbon footprint. Possibility of offering a variety of shapes. Process optimised to limit tasks. Optimisation of the final product's weight: savings in transport costs / reduced difficulty in assembly and installation.
Market/Target audience	Furniture: integration of the material into furniture (B2B). POS advertising: use of the material to offer product display solutions (B2B). Aeronautics: cabin interiors (B2B). Luxury sector: high-end products (B2B). Action: sport (B2C).
Technology/Process	Technical innovation: New composite material made from recycled cardboard. Process innovation: Eco-friendly process, control of carbon footprint and water consumption. Several R&D projects underway with major clients (aeronautics, furniture, etc.).



Axis 3: Plastic life cycle

● Innovative Solutions

Source

1	AEGIS PACKAGING	Singapore	Company that develops more sustainable coatings compared to conventional solutions for flexible packaging film that requires barrier properties, allowing for a reduction in plastic content and facilitating recycling.	SAIOLAN
2	CHAUDELEC	France	Electron beam solution for (a) decontaminating packaging prior to introducing food and (b) improving the properties of plastic and polymer packaging.	CCIBPB
3	PANDOBAC	France	Solution to reduce logistics packaging waste through a traceable reusable transport container rental service.	CCIBPB
4	ADVANCED PLASTIC SORTING	Belgium	Innovative sorting technology that improves plastic recycling in the context of waste shipment regulations, upcoming end-of-life vehicle (ELV) regulations, landfill restrictions and recycling target compliance.	ACLIMA
5	RECYCLEYE	UK	Development of artificial intelligence (AI) solutions for automated waste sorting. Products designed to increase the profitability of sorting plants (MRFs), improve material purity and reduce operating costs.	ACLIMA
6	REVALYU	Germany	Chemical recycling technology that closes the PET loop by producing virgin-quality r-PET with high resource efficiency.	ACLIMA
7	FIBRE STRAP	Sweden	FibreStrap™ is a sustainable alternative to plastic cable ties, made from certified Nordic wood fibres with a biocomposite fastener (PLA/hemp/PBAT).	CCIBPB
8	UBQ	Israel	UBQ Materials converts unsorted household waste into an advanced, climate-positive thermoplastic that serves as a sustainable alternative to conventional plastics, supporting circularity and innovation within the plastics value chain.	ACLIMA

● Good Practices

9	SOLTECO AND EZCARAY TOWN COUNCIL	Spain	The Town Council of Ezcaray (La Rioja, Spain), in collaboration with Solteco, has a comprehensive and ongoing project for the recovery of plastic waste that is difficult to recycle.	ADER
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1

AEGIS
PACKAGING

Founded in 2018
Headquarters in Singapore. Responsible for opening the market in Europe
Staff de 11 employees

What does it do
Company that develops more **sustainable coatings** compared to **conventional solutions** for **flexible packaging film** that **requires barrier properties**, allowing for a reduction in plastic content and facilitating recycling.



Activity

Aegis Packaging is a Singapore-based manufacturer specializing in high barrier hybrid coatings for flexible food packaging.

Product/Service

Superior Oxygen Barrier: Unique hybrid composition enhanced with silicate fillers for excellent **OTR performance** and **flex-crack resistance**. The inclusion of silicate fillers enhances resistance to flex cracks, making it an excellent top coating for metallized, Alox coated films and metallized paper. Potential for **replacing aluminium foil packaging**. **Plastic Reduction:** down-gauging, easier to reduce plastic usage in multilayer packaging while having +95% recyclable content. **Mono-Material Compatibility:** Works effectively on **PE, PP, PET...** making it highly suitable for **mono-material packaging** solutions. **Liquid Format:** Sold in 25L cans (larger formats available).

Price

List Price: €5.0/liter (covers approx. 150m²-250m²). Volume discounts available.

Differential value

Less Plastic Usage: With a low coating weight of just 0,3 g/m², it is easier to achieve 95% recyclability and minimise eco-modulated EPR (Extended Producer Responsibility) fees and plastic Tax. When compared to EVOH for achieving over 95% recyclability and high OTR barriers, EVOH may require a laminate thickness of 150-200 microns. However, with Aegis's O2X™ low coating weight, this can be achieved with far less plastic used. **Enhanced Recyclability:** Aligns with the Europe 2030 Packaging Legislation (PPWR), prioritizing Grade A recyclability for materials achieving over 95% recyclability. Enables manufacturers to design and develop mono-material packaging, minimizing recycling costs compared to multi-material alternatives. **Extended Shelf Life:** Superior barrier performance effectively limits oxygen penetration, extending food freshness and contributing to the reduction of food waste.

Market/Target audience

Film Manufacturers & Converters interested in innovative sustainable packaging solutions. **Early Engagement Strategy:** Packaging manufacturers should be involved **early** in the product development phase to drive innovation adoption and shorten development time.

Technology/Process

Patented technology developed by a **Singaporean University**. **Pilot laminator** and barrier measure equipment available for testing in Singapore. **Application Process:** The optimal equipment for applying the coating is a solvent-based laminator with rotogravure cylinders, operating at speeds between 50 and 150 m/min. Flexo lines equipped with anilox rollers are also suitable for the application process.



OTR levels for Various Films Types		
Structure	OTR (23C - 0% RH)	WVTR (38 oC, 90% RH)
MDOPE25-O ₂ X™ //LLDPE40	0,2	3
PE25-O ₂ X™ //LLDPE40	0,5	3
SPE30-O ₂ X™ //LLDPE115	0,15	3
MBOPP25-O ₂ X™ //CPP40	0,15	0,5
BOPET12-O ₂ X™	0,1	20
BOPP25-O ₂ X™ //BOPP25	0,4	2,8
BOPP20-O ₂ X™ //CPP40	0,3	5



5

RECYCLEYE
QUALIBOT AND
QUANTISORT

Founded in the United Kingdom
Headquarters in London
Staff of 50 employees

What does it do
Recycleye's AI-based waste sorting solution aligns with ORHI+ objectives by improving efficiency in material separation and recovery, reducing the use of virgin resources, and optimizing recycling processes.



Activity	Development of Artificial Intelligence (AI) Solutions for automated waste sorting, Products engineered to enhance the profitability of materials recovery facilities (MRFs), improve material purity, and reduce operational costs.
Product/ Service	Recycleye QualiBot® – AI-Powered Robotic Picker: Accurate sorting by material and object (bottles, trays, cans, etc.). Capable of picking 35–65 items per minute (IPM). Equipped with a silicone gripper and pressure sensors to prevent empty picks. Quick installation with no need to modify the plant. Up to 98% purity in selected materials. Real-time dashboard for remote monitoring. Recycleye QuantiSort® – AI-Driven Optical Sorter: Up to 1,000 ejections per minute. Capable of sorting materials such as Dry Mixed Recyclables (DMR), Waste Electrical and Electronic Equipment (WEEE), and Construction and Demolition Waste (CDW). Identifies material subcategories that were previously impossible to classify. UltraResolution® sensor capable of detecting objects as small as 5 mm. Modular design adaptable to varying throughput requirements.
Price	Equipment costs range from €150,000 to €350,000.
Differential value	Retrofit-Compatible and Modular Solutions for Existing Facilities. Reduction in labour and safety-related costs. High reliability and 24/7 operational availability. AI trained on over 1.6 billion images. Collection and sorting based on complex visual decision-making. Post-installation support includes annual maintenance, spare parts, remote assistance, and training.
Market/ Target audience	Materials Recovery Facilities (MRFs): Municipal Solid Waste (MSW), Waste Electrical and Electronic Equipment (WEEE), Construction and Demolition Waste (CDW), Industrial Waste, etc. Designed for organisations seeking to improve output purity and operational efficiency. Operational sites in 8 countries, with clients including Biffa, SUEZ, SWEEEP Kuusakoski, Bryson, and Panda.
Technology/ Process	Deep Learning Algorithms and Computer Vision; Six-axis robots with pick-rotate-release functionality; Ejection systems equipped with configurable nozzle bar arrays; SCADA platform for seamless integration with plant control systems; 20/20 Mbps internet; connectivity; Data accessible via the control dashboard.



Axis 4: Process optimisation

● Innovative Solutions

Source

1	SHIBATA	Japan	Is a company dedicated to the manufacture of high-performance nanobubble (NB) generating equipment for use in chemical-free water treatment, sustainable food production (agricultural and fish farming) and natural resource recovery.	SAIOLAN
2	OK ENGINEERING	Japan	Solution based on nanobubble generation technology that offers efficiency in industrial processes, agriculture and fish farming.	SAIOLAN
3	AR-TEKH	France	Solution that avoids the use of chemicals by generating a bactericide on site from water and salt.	CCIBPB
4	SALMOTRUCK	France	Solution that allows the disinfection of animal feed infected with salmonella, preventing it from being considered waste and promoting the use of resources.	CCIBPB
5	CALPECH	Spain	Development and production of a range of products to optimise biogas production: carbon-encapsulated iron nanoparticles produced by recycling agricultural waste.	APESA
6	ORESTEO	Spain	Is an innovative energy storage and management solution designed to enable wineries and agri-food industries to save energy, recover heat and optimise their thermal processes through smart accumulators and automated control.	ADER
7	CIX GREENTECH	Germany	Innovative water treatment system that uses electrochemical technology for on-site treatment, without the need for chemicals, of water containing persistent contaminants such as PFAS (perfluoroalkyl substances), drug residues, hormones and other organic contaminants.	SAIOLAN
8	ORTIE CITYCOMPOST	France	A solution that addresses the problem of sorting organic waste at source in urban areas. It proposes low-frequency collection of urban organic waste using crane-operated composters.	APESA
9	ARKEALE BIOCAPSULE	France	Hyperlocal treatment of biological waste to obtain renewable energy for self-consumption.	APESA
10	THE 8 IMPACT	France	French start-up specialising in the circular transformation of post-consumer trainers into high-performance micronised elastomeric materials.	ADER

● Good Practices

11	MILLOR QUE NOU	Spain	Initiative by a public body to promote reuse and waste reduction by promoting a culture of repair among citizens.	SAIOLAN
12	RECUP	France	Association that aims to implement the separation of biowaste at source and its recovery using the Japanese Bokashi method.	APESA
13	PATXA'MA	France	Good practice in process improvement related to construction materials.	ESTIA

3

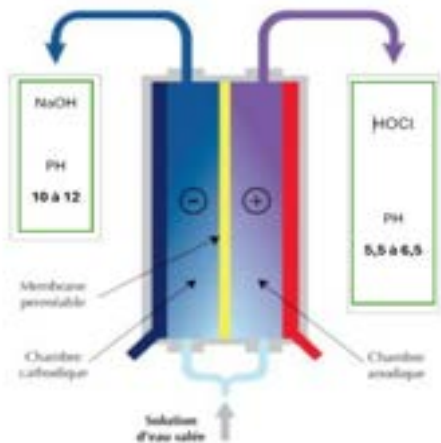
GENERATOR IN SITU
BIOCIDE HOCL AR-TEKH

Founded in 2009
Headquarters in 1 rue du Bois des
Braves-Za La Poterie, 22400 LAMBALLE
Staff of 5 employees, including the
manager Loïc GOURET

What does it do
Avoiding the use of
chemicals by generating
a bactericide in situ from
water and salt.



Activity	AR-TEKH sells poultry equipment, designs and installs poultry feed manufacturing equipment, drying and manure pelleting systems. The company specialises in drying and cleaning processes for the livestock/agricultural sector and also for industry.
Product/ Service	In situ biocide HOCL generator: It is a solution that ensures the bacteriological control of water in the agri-food industry and agriculture. From a process mastered by AR-TEKH, two solutions are produced: <u>Hypochlorous acid (HOCl)</u> , naturally present in our bodies and those of animals. It helps fight infections. It is a highly potent bactericide. HOCL is bactericidal, fungicide, virucidal, sporicidal and algacidal. Bacteria such as Escherichia coli, when exposed to Hypochlorous Acid, die in less than 100 milliseconds. <u>Sodium Hydroxide (NaOH)</u> , a useful cleaning agent thanks to its ability to break down fat and proteins. It is the ideal ally in processing workshops in particular.
Price	Equipment from 20 k€ for a production capacity of 50 L/hour.
Differential value	This equipment is remarkable in several ways. On-site autonomous production without chemicals; Non-toxic solution for living organisms Approvals: "Article 95 Compliance" & "DWI approval"; The alternative to chlorine, chlorine dioxide and hydrogen peroxide.
Market/ Target audience	The main targets of this solution are agriculture, including livestock farming, arboriculture, market gardening, as well as the agri-food industry and the medical world (orthodontics, ophthalmology, etc.). It can be used in different forms: as drinking water (plant and animals), rinsing water (fruit and vegetables), spraying, high-pressure cleaner, cleaning of buildings or means of transport or processing surfaces, spraying in buildings.
Technology/ Process	The generator produces a high-performance disinfectant from an electrolyzed brine (water + salt). It can produce 5 to 1,200 liters of HOCl per hour in a concentration of 500 ppm FAC (Free Active Chlorine). The size of the generator depends on the amount of water to be treated and the initial water conditions.



Partner organisations participating in Thematic and International Monitoring and contact details

1	SAIOLAN	Support centre for the development of new business activities	Iratxe Acha	iacha@saiolan.com
2	ACLIMA	Basque Environment Cluster	Juan Antonio Gascón	jagascon@aclima.eus
3	APESA	Technology Centre for the Environment and Risk Management	Juliette Denis de Rivoyre	juliette.denis-de-rivoyre@apesa.fr
4	ADER	La Rioja Economic Development Agency	Enrique Esteban	eesteban@larioja.org
5	ESTIA	Higher School of Advanced Industrial Technologies	Iban Lizarralde	i.lizarralde@estia.fr
6	CCIBPB	Bayonne Chamber of Commerce and Industry Basque Country	Pierre Michel Etcheverry	pm.etccheverry@bayonne.cci.fr

