D4.1. Appendix No 4
Cluster of bio-based solutions classified as “packaging products for food and drinks” (WP4, T4.2.1)

Scope: The appendix presents all the scoped solutions that were classified as “packaging products for food and drinks” The information on individual solutions are presented in the form of the filled – up templates. Before presenting an individual solution, information is given on the Bio4HUMAN partner responsible for scoping the given solution, as well as on the Investigation Line of T.4.2.1., the solution results from. There is also information on the presence / lack of presence of the solution on the final List of 27 bio-based products and technologies.

Note: The templates were filled up by the Leaders of Investigation Line based on the gathered information. Empty spaces in the templates mean *“no information available on the given criterion”* or *“difficulty in assessing the utility functions of the given solution”*. The second reason was quite common in relation to the potential application of the solution given to the different supply chain stages of humanitarian interventions. The filled-up templates were provided to PRO CIVIS for further initial analysis. At the stage of internal consultation – all the Bio4HUMAN partners were granted access to the presentation of the solutions and were asked to provide comments and opinions on the subject of the potential applicability and functionality of the solution in the context of solid waste management in the humanitarian interventions.

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The appendix No 4 includes presentation of the following 13 bio-based solutions:

1. High barrier and compostable packaging materials for food contact applications – packaging of dried or dehydrated foods

Responsible partner: ITENE
INVESTIGATION LINE: I

Solution 1 **on the final List**	**High barrier and compostable packaging materials for food contact applications (*i.e.* packaging of dried or dehydrated foods)**
Product / service	Yes
Technology	Yes
I. Basic information	
Description of functions *What is the effect or final product?* Compostable high barrier flexible multilayer materials. Designed for packaging dry or dehydrated foods. Based on cellulose and bioplastics. 100% biodegradable and industrially compostable.	

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High barrier to moisture and oxygen.
With active properties that extend the shelf life of products up to 24 months.

Description of technology and TRL level (if applicable)
TRL 7-8 (prototype demonstration).

Description of product/service and TRL level (if applicable)
Product: TRL 7-8 (prototype demonstration).

Basic conditions of use
Please include also minimum requirements of a given solution regarding the availability of public infrastructure.
NA
Please include the optimal scale/size of investment at which their solution or technology makes economic sense.
Technologies and services investment are more than 2-4 million euros. Packaging solutions costs are more than 8€/kg of the materials.
What kind of waste the solution is able to utilize or valorise?
Plant-based, by-products and waste: industrial waste and agricultural waste.
To what extent does the use of a given solution or technology depend on climatic conditions?
Yes, it is affected.
Is it possible to refine the solution as an autonomous and mobile unit? (if applicable)
Yes.

Solution owner and his willingness to provide detailed technical and technological data
ITENE -Packaging, Transport and Logistics Research Institute.

Has the Life Cycle Analysis been already done for this solution?
Yes. Confidential information.

Source of data
Response to online survey on November 28th.

References
Please include a description and a photo of any examples of the implementation.

Source: https://cordis.europa.eu/project/id/606548/es

II. End-of-life stage addressed by the solution

Please describe if the solution refers to 4R Principle (Reduce, reuse, recycle, recover) biodegradability, composability or other means of end-of-life stage.
Biodegradable and compostable.

III. Needs of the humanitarian sector and / or of the solid waste management constraints in the humanitarian settings addressed by identified solution

We are looking for:
***1) bio - based products / services** in order to diminish the amounts of waste generated by humanitarian interventions*
***2) bio - based technologies** in order to cope with the amounts of waste generated in the humanitarian context.*

The expected characteristics of the bio-based solutions potentially applicable in the humanitarian context:
- *ability to eliminate the humanitarian waste, i.e. plastic, aluminium, metal, glass, paper & cardboard, organic, wood, medical and chemical;*
- *sustainability – addressing environmental, economic, and social factors; be adaptable to local conditions; provide long-term benefits without unintended negative consequences;*
- *utilization of local resources and knowledge.*

In case of a doubt as for the applicability of a given product, service or technology in the humanitarian context – please consult the Humanitarian Assessment Report prepared by People In Need and Polish Humanitarian Action. The Report is enclosed; also available in the SharePoint.

Please describe below how the solutions address the needs.
Biodegradable and compostable products that can contribute to reduce the amount of waste.

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IV. Logistic supply chains application potential - in which stage?

The 'humanitarian supply chain' *is defined as: "The planning, procurement, storage, transport and delivery of different forms of supplies, works & services used for projects and to respond to emergencies. This includes the flow of supplies from origin to destination but also more complex work of forecasting, optimising resources, value for money to ensure the most efficient process, and decreasing the carbon footprint of related operations"*

Type of waste in humanitarian context:

COMMODITY TYPE	***PACKAGING***
Grains, cereals	*Virgin woven PP bags*
Cornmeal, fortified flour	*Hybrid paper bags and PP woven bags with PE*
Fortified vegetable oil	*Steel cans, plastic bottles, cardboard cartons*
Specialised nutritious food products	*Metallised flexible plastic sachets and pouches, plastic box liners, cardboard cartons*

TYPICAL NON-FOOD ITEMS
Tents, shelter kits, tarpaulin, synthetic sleeping mats, blankets, clothes, mosquito nets, timber, cement.
Nutrition-specialized products, such as Ready-to-Use Therapeutic Food (RUTF) and Ready-to-Use Supplementary Foods (RUSF); for example, Plumpy'Nut, vitamin A supplements, iron-folic acid supplements, and micronutrient supplements. These can be on tinplate or laminated packaging structures.
Medical supplies, wheelchairs, cold boxes.
Jerrycans/buckets (water containers), water purification tablets (Aquatabs, PUR), Water pumps, hygiene products (soap), menstrual hygiene products (single-use pads, reusable pads-ex. AFRIpads), water testing products, chemicals (such as chlorine), and equipment (for pump mechanics).
Stoves (fuel-efficient saving stoves), seeds, farming tools (hoes, axes, rakes, watering cans, buckets), storage (bags and sacks), fertilizers, pesticides, etc.
Paper, printed products, office equipment, electronic waste, etc.
Petroleum, oil, and lubricants. Electrical transformers with polychlorinated biphenyls (PCBs). Chemicals such as acid, chlorine, and pesticides. Asbestos-containing materials. Treated timber, etc.

Please indicate the link of the supply chain for which the solution can be applied? Describe how.

Identification of needs
.....
Conceptualization and planning
.....
Procurement – sourcing/ purchasing of products and services
.....
Goods collection in warehouses and repacking for transport to final destination
.....
Custom clearance
.....
Transport to the destination country (often multi-stage and using different modes of transport)
.....
Transport to the final destinations – last mile
.....
Storage at the final destination
.....
Operational logistic at final destination - distribution of goods and services
.....

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2. PLA bottles for water + small water bottling unit for blowing and filling PLA bottles

Responsible partner: PRO CIVIS
INVESTIGATION LINE: IV

Solution 2 **on the final List**	**PLA bottles for water** **+** **Small water bottling unit for blowing and filling PLA bottles**
Product / service	**X**
Technology	**-**

I. Basic information

Description of functions

PLA water bottles – 100 % plant-based and 100 % non-gmo.

PLA (Polylactic Acid) bottles represent a significant advancement in the fight against plastic pollution. Unlike traditional petroleum-based plastics, **PLA** is derived from renewable plant resources, making it a more eco-friendly option.

The 100% plant-based composition refers to the whole bottle, incl. cap and label.

The available PCO1810 preform and closure stands allow for the mass production of 350 ml up to 500 ml bottles. However, there is also an information at the official website about the technical possibilities to deliver compostable water bottles up to 1.5 litters or even larger. The Solution Owner explains further in this regard:

"We can provide bottles with different neck size and with different sizes – a 28mm neck size and a 38mm neck size, both confirming to international blowmoulding standards. We can produce preforms that can blow bottles between 100 ml and 2 liter if needed – this is easy to do with an extra mould. At this moment we have 350ml, 500ml and 1 liter preforms/bottles that we can produce right away."

The Solution Owner declares also the readiness to provide small **production (bottling) unit on wheels** for filtering local water and where the PLA bottles can be blown, filled and capped on side. This way there is no need to ship bottles of water to the disaster side. Instead, the much smaller preforms may be sent. The production unit (incl. preforms and caps) can be just hooked behind a pickup, or below a helicopter and drop onto the side, where they are needed the most. This solution saves transportation, and logistics costs and makes the delivery of bottles more flexible.

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Description of technology and TRL level (if applicable)

–

Description of product/service and TRL level (if applicable)

For **the product** itself it is TRL 9 (full commercial deployment) - it means the possibility to produce blown PLA bottles, PLA bottles with water and PLA preforms and biobased caps.

As for **the production (bottling) unit** – the Solution Owner is at stage 4 (technology validated in a lab).

Basic conditions of use

Please include also minimum requirements of a given solution regarding the availability of public infrastructure.

Non.

Please include the optimal scale/size of investment at which their solution or technology makes economic sense.

Non applicable to the product.
As for the production (bottling) unit – in the process of finding out.

What kind of waste the solution is able to utilize or valorise?

Non applicable.

To what extent does the use of a given solution or technology depend on climatic conditions?

No dependence.

Is it possible to refine the solution as an autonomous and mobile unit? (if applicable)

Yes, in case of the production (bottling) unit.

Solution owner and his willingness to provide detailed technical and technological data

GS-Green Packaging B.V.
De Kreijenbeek 251
5553BG Valkenswaard

Not really sure, if the Company is the producer of the PLA bottles or only European representative of an non - European manufacturer.

The Solution Owner further explains:
"My Dutch company is part owner of a USA company that makes PLA preforms and caps in the USA. And together with a different European company my Dutch company is creating a production facility for PLA preforms, biobased caps and blown bottles in Europe. Where I provide the network / suppliers / knowledge and sales network for the products and the other company does the production of the preforms and bottles. There is an intention to partner in a new entity to do the production of the PLA preforms and bottles in Europe together as part ownership."

Has the Life Cycle Analysis been already done for this solution?

As for the LCA – the Solution Owner explains:
"The raw material manufacturer has done the LCA for the raw material, but we have not done it for the end product – the ready-made water bottle. We are willing to support with the basic information regarding our bottles. With all the different end of life solutions an LCA can be a challenging thing."

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Potentially helpful information for preparing LCA are available at:
https://plabottles.eu/benefits-of-pla-compared-to-other-packaging/

At the official web page, the Company presents also Life Cycle Impact Assessment of Polylactic Acid (PLA) produced from sugarcane in Thailand.
https://www.corbion.com/about-corbion/sustainability/life-cycle-assessment

Source of data

- The webpage: https://plabottles.eu/
- The initial contact over the mail address: packaging@GS-companies.com

References

Please include a description and a photo of any examples of the implementation.

PLA bottles are made from sugar cane and produced in Thailand. In the near future, there will be also PLA made from sugar beet. Sugar cane and sugar beet are 2 of the highest yield per hectare crops used for PLA.

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Source: *the web page of GS-Green Packaging*

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II. End-of-life stage addressed by the solution

Please describe if the solution refers to 4R Principle (Reduce, reuse, recycle, recover) biodegradability, composability or other means of end-of-life stage.

Reduction of plastic waste.

The goal of the Company is to find the best end of life solutions for **the PLA bottles** and search for a value adding end of life.

The PLA bottles are industrial compostable – composting at the same time as garden waste. In nature/landfill the bottle will take a long time to break down – several years. When they breakdown in nature or industrial compost they do not create toxic or microplastic. They are also recyclable and can be burned cleanly, offering multiple end-of-life disposal options that are less harmful to the environment.

The PLA water bottle can be seamlessly integrated into recycling processes, composting facilities, boilers, and potentially even subjected to digestion in a specialized digester.

Moreover **the bottles**:

- are able to be used for 3D printing feedstock after they are used for drinking purposes; this way a safe nontoxic source of material can be used on side to 3D print products and spare parts;
- can be grinded and mixed with woodchips and pressed into briquets for a safe toxic free burning material.

III. Needs of the humanitarian sector and / or of the solid waste management constraints in the humanitarian settings addressed by identified solution

We are looking for:
***1) bio - based products / services** in order to diminish the amounts of waste generated by humanitarian interventions*
***2) bio - based technologies** in order to cope with the amounts of waste generated in the humanitarian context.*

The expected characteristics of the bio-based solutions potentially applicable in the humanitarian context:
· ability to eliminate the humanitarian waste, i.e. plastic, aluminium, metal, glass, paper & cardboard, organic, wood, medical and chemical;
· sustainability – addressing environmental, economic, and social factors; be adaptable to local conditions; provide long-term benefits without unintended negative consequences;
· utilization of local resources and knowledge.

In case of a doubt as for the applicability of a given product, service or technology in the humanitarian context – please consult the Humanitarian Assessment Report prepared by People In Need and Polish Humanitarian Action. The Report is enclosed; also available in the SharePoint.

- *Please describe below how the solutions addresses the needs.*

The benefits of **PLA** compared to other packaging is huge. **PLA** has multiple end of life options, is made from a renewable resource. Uses much less energy than other packaging and uses more renewable energy during production. Also, the CO2 emission is much lower, and the water use during production is also lower than every other packaging type.

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The advantages of using PLA:

- biobased – helps to decouple from fossil feedstocks and reduce carbon footprint emissions
- excellent functional properties – allows durable applications and also allows for reduced use of material
- mechanical/chemical recycling – helps to keep valuable resources in the circular economy
- organic recycling including composting and anaerobic digestion – helps to divert organic waste from landfill/incineration
- biodegradable – for those applications that are prone to end up in the environment, biodegradable plastics help to reduce the burden on nature
- incineration with energy recovery – incineration of biobased plastics is always the lower carbon footprint solution due to the renewable carbon content
- non-toxic in nature, for humans and animals.

According to the Solution Owner: *"The product will fit ideally in the humanitarian sector – a plant-based material that does not pollute the disaster side and have multiple valuable end of life solutions that can benefit the disaster side"*.

IV. Logistic supply chains application potential - in which stage?

The 'humanitarian supply chain' *is defined as: "The planning, procurement, storage, transport and delivery of different forms of supplies, works & services used for projects and to respond to emergencies. This includes the flow of supplies from origin to destination but also more complex work of forecasting, optimising resources, value for money to ensure the most efficient process, and decreasing the carbon footprint of related operations"*

Type of waste in humanitarian context:

COMMODITY TYPE	***PACKAGING***
Grains, cereals	*Virgin woven PP bags*
Cornmeal, fortified flour	*Hybrid paper bags and PP woven bags with PE*
Fortified vegetable oil	*Steel cans, plastic bottles, cardboard cartons*
Specialised nutritious food products	*Metallised flexible plastic sachets and pouches, plastic box liners, cardboard cartons*
TYPICAL NON-FOOD ITEMS	
Tents, shelter kits, tarpaulin, synthetic sleeping mats, blankets, clothes, mosquito nets, timber, cement.	
Nutrition-specialized products, such as Ready-to-Use Therapeutic Food (RUTF) and Ready-to-Use Supplementary Foods (RUSF); for example, Plumpy'Nut, vitamin A supplements, iron-folic acid supplements, and micronutrient supplements. These can be on tinplate or laminated packaging structures.	
Medical supplies, wheelchairs, cold boxes.	
Jerrycans/buckets (water containers), water purification tablets (Aquatabs, PUR), Water pumps, hygiene products (soap), menstrual hygiene products (single-use pads, reusable pads-ex. AFRIpads), water testing products, chemicals (such as chlorine), and equipment (for pump mechanics).	
Stoves (fuel-efficient saving stoves), seeds, farming tools (hoes, axes, rakes, watering cans, buckets), storage (bags and sacks), fertilizers, pesticides, etc.	
Paper, printed products, office equipment, electronic waste, etc.	
Petroleum, oil, and lubricants. Electrical transformers with polychlorinated biphenyls (PCBs). Chemicals such as acid, chlorine, and pesticides. Asbestos-containing materials. Treated timber, etc.	

Please indicate the link of the supply chain for which the solution can be applied? Describe how.

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Identification of needs
.....
Conceptualization and planning
.....
Procurement – sourcing/ purchasing of products and services
Potential application.
Goods collection in warehouses and repacking for transport to final destination
.....
Custom clearance
.....
Transport to the destination country (often multi-stage and using different modes of transport)
.....
Transport to the final destinations – last mile
.....
Storage at the final destination
Potential application.
Operational logistic at final destination - distribution of goods and services
Potential application.

3. Starch-based biopolymer active, intelligent food packaging

Responsible partner: PRO CIVIS
INVESTIGATION LINE: IV

Solution 3 **not on the final List**	**Starch-based biopolymer active, intelligent food packaging**
Product / service	**X**
Technology	**-**
I. Basic information	
Description of functions This prototype film is an active food packaging which easily indicates food spoilage to consumers via a colour change. The starch-polyaniline biopolymer film reinforced with cellulose nanocrystals (CNC) extracted from agricultural wastes has been synthesised and applied as active and intelligent food packaging. The film is biodegradable and is able to indicate food spoilage simply through the change of colour from green to blue that can be easily differentiated by the naked	

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eye. Furthermore the polymer film may act as an antioxidant and a real time food freshness indicator simultaneously, reducing food wastage.

The product fulfils the key demands of smart packaging as it is an upgraded concept of food packaging, aligned with global food wastage and environmental pollution concerns, which would be resilient in the food value chain.

Description of technology and TRL level (if applicable)

-

Description of product/service and TRL level (if applicable)

In the process of finding out.

The Innovators are targeting the branded suppliers of the gourmet market to purchase this packaging film. The product is able to create business value opportunities for the customers through improved inventory management, product integrity and user experience. The Innovators are working on establishing more collaborations among the industrial stakeholders, incubation centre and investment company to ensure smooth progress of the product development.

Basic conditions of use

Please include also minimum requirements of a given solution regarding the availability of public infrastructure.

No requirements.

Please include the optimal scale/size of investment at which their solution or technology makes economic sense.

Non applicable.

What kind of waste the solution is able to utilize or valorise?

The solution provides for the reduction of packaging waste.

To what extent does the use of a given solution or technology depend on climatic conditions?

Non applicable.

Is it possible to refine the solution as an autonomous and mobile unit? (if applicable)

Non applicable.

Solution owner and his willingness to provide detailed technical and technological data

National University of Malaysia and Tunku Abdul Rahman University in Malaysia.

Has the Life Cycle Analysis been already done for this solution?

In the process of finding out.

The key barrier of this product is its higher cost compared to traditional, non-intelligent plastic packaging. This elevated cost is often associated with environmental, social and governance (ESG) investment. However, the cost has dropped in these last few years and is expected to decline even further, hoping that its cost will be as low as everyday goods in near future.

Source of data

- The lists of winners of awards of the Sustainable Packaging Summit for 2023: https://packagingeurope.com/sustainability-awards/about-the-awards
- The abstract of the article: *"Recent Advances and Applications in Starch for Intelligent Active Food Packaging: A Review"* (article available at the National Library of Medicine).
- The mail correspondence with the Professor Ishak Bin Ahmad (the School of Chemical Sciences and Food Technology, Faculty of Science and

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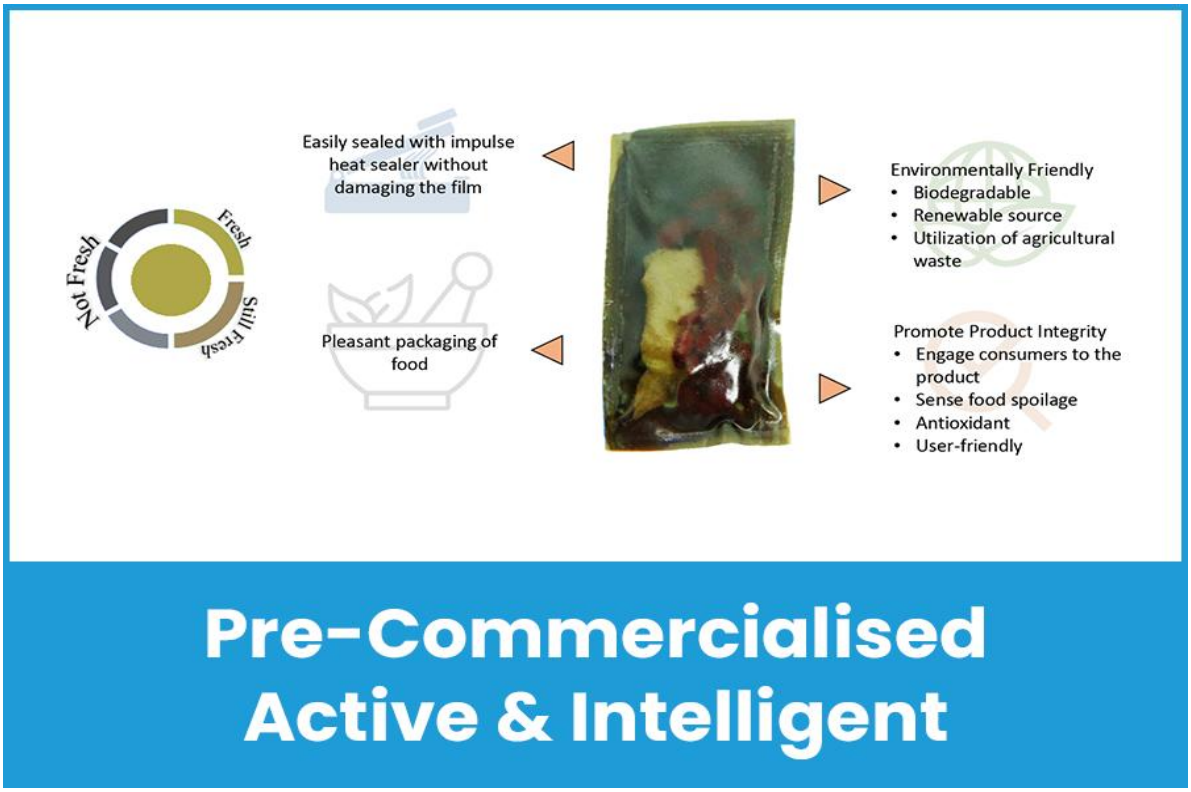
Technology, Universiti Kebangsaan Malaysia), over the mail address: dfst@ukm.edu.my .

References

Please include a description and a photo of any examples of the implementation.



Source: https://packagingeurope.com/sustainability-awards/about-the-awards

II. End-of-life stage addressed by the solution

Please describe if the solution refers to 4R Principle (Reduce, reuse, recycle, recover) biodegradability, composability or other means of end-of-life stage.

Reuse of agricultural waste.
Reduction of packaging waste.

III. Needs of the humanitarian sector and / or of the solid waste management constraints in the humanitarian settings addressed by identified solution

We are looking for:
***1) bio - based products / services** in order to diminish the amounts of waste generated by humanitarian interventions*
***2) bio - based technologies** in order to cope with the amounts of waste generated in the humanitarian context.*

The expected characteristics of the bio-based solutions potentially applicable in the humanitarian context:
· ability to eliminate the humanitarian waste, i.e. plastic, aluminium, metal, glass, paper & cardboard, organic, wood, medical and chemical;
· sustainability – addressing environmental, economic, and social factors; be adaptable to local conditions; provide long-term benefits without unintended negative consequences;
· utilization of local resources and knowledge.

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In case of a doubt as for the applicability of a given product, service or technology in the humanitarian context – please consult the Humanitarian Assessment Report prepared by People In Need and Polish Humanitarian Action. The Report is enclosed; also available in the SharePoint.

Please describe below how the solutions addresses the needs.

By developing starch-polyaniline-CNC biopolymer film in full scale, the plastic wastes arising from food packaging can be diminished to a great extent.

This product is able to reduce the plastic pollution arising from food packaging, minimise food wastage and transform agricultural wastes into wealth.

IV. Logistic supply chains application potential - in which stage?

The 'humanitarian supply chain' *is defined as: "The planning, procurement, storage, transport and delivery of different forms of supplies, works & services used for projects and to respond to emergencies. This includes the flow of supplies from origin to destination but also more complex work of forecasting, optimising resources, value for money to ensure the most efficient process, and decreasing the carbon footprint of related operations"*

Type of waste in humanitarian context:

COMMODITY TYPE	***PACKAGING***
Grains, cereals	*Virgin woven PP bags*
Cornmeal, fortified flour	*Hybrid paper bags and PP woven bags with PE*
Fortified vegetable oil	*Steel cans, plastic bottles, cardboard cartons*
Specialised nutritious food products	*Metallised flexible plastic sachets and pouches, plastic box liners, cardboard cartons*

TYPICAL NON-FOOD ITEMS
Tents, shelter kits, tarpaulin, synthetic sleeping mats, blankets, clothes, mosquito nets, timber, cement.
Nutrition-specialized products, such as Ready-to-Use Therapeutic Food (RUTF) and Ready-to-Use Supplementary Foods (RUSF); for example, Plumpy'Nut, vitamin A supplements, iron-folic acid supplements, and micronutrient supplements. These can be on tinplate or laminated packaging structures.
Medical supplies, wheelchairs, cold boxes.
Jerrycans/buckets (water containers), water purification tablets (Aquatabs, PUR), Water pumps, hygiene products (soap), menstrual hygiene products (single-use pads, reusable pads-ex. AFRIpads), water testing products, chemicals (such as chlorine), and equipment (for pump mechanics).
Stoves (fuel-efficient saving stoves), seeds, farming tools (hoes, axes, rakes, watering cans, buckets), storage (bags and sacks), fertilizers, pesticides, etc.
Paper, printed products, office equipment, electronic waste, etc.
Petroleum, oil, and lubricants. Electrical transformers with polychlorinated biphenyls (PCBs). Chemicals such as acid, chlorine, and pesticides. Asbestos-containing materials. Treated timber, etc.

Please indicate the link of the supply chain for which the solution can be applied? Describe how.

Identification of needs

.....

Conceptualization and planning

.....

Procurement – sourcing/ purchasing of products and services

.....

Goods collection in warehouses and repacking for transport to final destination

Potential application.

Custom clearance

.....

Transport to the destination country (often multi-stage and using different modes of transport)

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.....
Transport to the final destinations – last mile
.....
Storage at the final destination
Potential application.
Operational logistic at final destination - distribution of goods and services
Potential application.

4. Bio Based Pouch

Responsible partner: PRO CIVIS
INVESTIGATION LINE: IV

Solution 4 **not on the final List**	**Bio Based Pouch**
Product / service	**X**
Technology	**-**

I. Basic information

Description of functions

Bio Based Pouches by Pouch Factory are made of 100 % bio-based materials. The top layer is 100 % PaperWise kraft paper. The middle layer is a nature flex layer by Futamura, consisting of wood pulp from FSC-managed forests. The inner layer is a Bio Based PLA biodegradable film, ensuring the right protection. The pouch has a natural paper structure.

The Pouches are suitable predominantly for dry product ingredients. Due to the protective inner layers, **the Pouches** offer a robust protection for products, thus allowing the pouch to come in direct contact with food items.

This type of **Pouches** are excellently suitable for products such as tea, muesli, dry sweets, herbs and supplements. Very suitable for dry products in smaller packaging with a weight of less than 500 grammes, without oils, fats or moist.

Description of technology and TRL level (if applicable)

-

Description of product/service and TRL level (if applicable)

The Pouches are already in the market.

Basic conditions of use

Please include also minimum requirements of a given solution regarding the availability of public infrastructure.

Funded by the European Union

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Non applicable.

Please include the optimal scale/size of investment at which their solution or technology makes economic sense.
Non applicable.

What kind of waste the solution is able to utilize or valorise?
Non applicable.

To what extent does the use of a given solution or technology depend on climatic conditions?
No dependence.

Is it possible to refine the solution as an autonomous and mobile unit? (if applicable)
Non applicable.

Solution owner and his willingness to provide detailed technical and technological data

The Pouchfactory
Headquarters:
Watergoorweg 67
3861 MA Nijkerk
The Netherlands

Has the Life Cycle Analysis been already done for this solution?

In the process of finding out.

Source of data

- The webpage: https://pouchfactory.eu/
- The initial contact over the mail address: info@pouchfabriek.nl and over the contact form at the official webpage.

References
Please include a description and a photo of any examples of the implementation.

There are different options for the preservation of quality, resealability and presentation of the packaging, zippers, a tear notch and also a Euro hole.

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Source: *the web page of "The Pouchfactory"*

II. End-of-life stage addressed by the solution

Please describe if the solution refers to 4R Principle (Reduce, reuse, recycle, recover) biodegradability, composability or other means of end-of-life stage.

Reduction of plastic waste.

The pouch is made of vegetable raw materials originating from FSC-managed forests.
The renewable raw materials are basically suitable for composting but in practice, the composting processes are not ready yet.

Based on the current sorting systems in Europe it is not yet possible to compost bio plastics. Bio based plastics are currently not yet being recycled but processed via the waste incineration process. Less CO_2 is released however, than when using the traditional non-recyclable plastic packaging. This is mainly due to the use of bioplastics originating from plants.

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III. Needs of the humanitarian sector and / or of the solid waste management constraints in the humanitarian settings addressed by identified solution

We are looking for:
***1) bio - based products / services** in order to diminish the amounts of waste generated by humanitarian interventions*
***2) bio - based technologies** in order to cope with the amounts of waste generated in the humanitarian context.*

The expected characteristics of the bio-based solutions potentially applicable in the humanitarian context:
· ability to eliminate the humanitarian waste, i.e. plastic, aluminium, metal, glass, paper & cardboard, organic, wood, medical and chemical;
· sustainability – addressing environmental, economic, and social factors; be adaptable to local conditions; provide long-term benefits without unintended negative consequences;
· utilization of local resources and knowledge.

In case of a doubt as for the applicability of a given product, service or technology in the humanitarian context – please consult the Humanitarian Assessment Report prepared by People In Need and Polish Humanitarian Action. The Report is enclosed; also available in the SharePoint.

- *Please describe below how the solutions addresses the needs.*

This kraft paper **Pouch** is made of organic materials. The bio-based PLA-inner layer ensures the protection. Due to the organic top layer this pouch is eco-friendly.

The way, the bio-based **Pouch** helps to protect the environment:

- Pouch Factory makes use of vegetable materials
- by making use of the bio-based PLA film **the Pouch** saves 30 to 50% of energy relative to traditional synthetic film
- the processing of bio plastics releases significantly less CO_2

IV. Logistic supply chains application potential - in which stage?

***The 'humanitarian supply chain'** is defined as: "The planning, procurement, storage, transport and delivery of different forms of supplies, works & services used for projects and to respond to emergencies. This includes the flow of supplies from origin to destination but also more complex work of forecasting, optimising resources, value for money to ensure the most efficient process, and decreasing the carbon footprint of related operations"*

Type of waste in humanitarian context:

COMMODITY TYPE	***PACKAGING***
Grains, cereals	*Virgin woven PP bags*
Cornmeal, fortified flour	*Hybrid paper bags and PP woven bags with PE*
Fortified vegetable oil	*Steel cans, plastic bottles, cardboard cartons*
Specialised nutritious food products	*Metallised flexible plastic sachets and pouches, plastic box liners, cardboard cartons*
TYPICAL NON-FOOD ITEMS	
Tents, shelter kits, tarpaulin, synthetic sleeping mats, blankets, clothes, mosquito nets, timber, cement.	
Nutrition-specialized products, such as Ready-to-Use Therapeutic Food (RUTF) and Ready-to-Use Supplementary Foods (RUSF); for example, Plumpy'Nut, vitamin A supplements, iron-folic acid supplements, and micronutrient supplements. These can be on tinplate or laminated packaging structures.	

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Medical supplies, wheelchairs, cold boxes.
Jerrycans/buckets (water containers), water purification tablets (Aquatabs, PUR), Water pumps, hygiene products (soap), menstrual hygiene products (single-use pads, reusable pads-ex. AFRIpads), water testing products, chemicals (such as chlorine), and equipment (for pump mechanics).
Stoves (fuel-efficient saving stoves), seeds, farming tools (hoes, axes, rakes, watering cans, buckets), storage (bags and sacks), fertilizers, pesticides, etc.
Paper, printed products, office equipment, electronic waste, etc.
Petroleum, oil, and lubricants. Electrical transformers with polychlorinated biphenyls (PCBs). Chemicals such as acid, chlorine, and pesticides. Asbestos-containing materials. Treated timber, etc.

Please indicate the link of the supply chain for which the solution can be applied? Describe how.

Identification of needs
.....
Conceptualization and planning
.....
Procurement – sourcing/ purchasing of products and services
Potential application.
Goods collection in warehouses and repacking for transport to final destination
Potential application.
Custom clearance
.....
Transport to the destination country (often multi-stage and using different modes of transport)
.....
Transport to the final destinations – last mile
.....
Storage at the final destination
Potential application.
Operational logistic at final destination - distribution of goods and services
Potential application.

5. NAKU PLA/rPLA Bottle/Bioplastic Bottle 250ml, 500ml and 750ml

Responsible partner: IBF
INVESTIGATION LINE: III

Solution 5 **not on the final List**	**NAKU PLA/rPLA Bottle/Bioplastic Bottle 250ml, 500ml and 750ml**
Product / service	*X*
Technology	
I. Basic information	

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Description of functions
What is the effect or final product?
The NaKu bio bottle or PLA/rPLA bottle is the ideal container for drinks. It contains no plasticizers such as bisphenol A, phthalates or antimony and consists of 100% natural plastic/PLA plus 20% recycled PLA, or in other words: plants and lactic acid.

The NaKu bioplastic bottle - PLA/rPLA bottle is ideal for drinks, solid foods, cosmetics, detergents and much more.

Description of technology and TRL level (if applicable)
Already on the market

Description of product/service and TRL level (if applicable)
The NaKu bio bottle or PLA/rPLA bottle is the ideal container for drinks - without any plastic! It contains no plasticizers such as bisphenol A, phthalates or antimony and consists of 100% natural plastic/PLA plus 20% recycled PLA, or in other words: plants and lactic acid.

The NaKu bioplastic bottle - PLA/rPLA bottle is ideal for drinks, solid foods, cosmetics, detergents and much more. The NaKu bio bottles – PLA/rPLA bottles are recyclable and also compostable. The NaKu bio bottle - PLA/rPLA bottle made of bioplastic is 7% lighter than conventional plastic.

Basic conditions of use
Please include also minimum requirements of a given solution regarding the availability of public infrastructure.
Please include the optimal scale/size of investment at which their solution or technology makes economic sense
What kind of waste the solution is able to utilize or valorise?
To what extent does the use of a given solution or technology depend on climatic conditions?
Is it possible to refine the solution as an autonomous and mobile unit? (if applicable)

Max operating temp is 55 degrees.

Solution owner and his willingness to provide detailed technical and technological data
Yes, did respond positively when contacted.

Has the Life Cycle Analysis been already done for this solution?
For some products, there has been LCA done but for older bottles.

Source of data.
https://www.naku.at/en/naku-pla-flasche-biokunststoff-flasche-250ml-und-500ml/, https://www.naku.at/wp-content/uploads/2024/10/NaKu_Gesamtkatalog_Englisch_google_uebersetzt.pdf,

References
Please include a description and a photo of any examples of the implementation.

Funded by the European Union

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Source: *the web page of NaKu*

II. End-of-life stage addressed by the solution

Please describe if the solution refers to 4R Principle (Reduce, reuse, recycle, recover) biodegradability, composability or other means of end-of-life stage.

III. Needs of the humanitarian sector and / or of the solid waste management constraints in the humanitarian settings addressed by identified solution

We are looking for:
***1) bio - based products / services** in order to diminish the amounts of waste generated by humanitarian interventions*
***2) bio - based technologies** in order to cope with the amounts of waste generated in the humanitarian context.*

The expected characteristics of the bio-based solutions potentially applicable in the humanitarian context:
· ability to eliminate the humanitarian waste, i.e. plastic, aluminium, metal, glass, paper & cardboard, organic, wood, medical and chemical;
· sustainability – addressing environmental, economic, and social factors; be adaptable to local conditions; provide long-term benefits without unintended negative consequences;
· utilization of local resources and knowledge.

In case of a doubt as for the applicability of a given product, service or technology in the humanitarian context – please consult the Humanitarian Assessment Report prepared by People In Need and Polish Humanitarian Action. The Report is enclosed; also available in the SharePoint.

Please describe below how the solutions addresses the needs.

The NaKu bio bottles – PLA/rPLA bottles are recyclable and also compostable

IV. Logistic supply chains application potential - in which stage?

***The 'humanitarian supply chain'** is defined as: "The planning, procurement, storage, transport and delivery of different forms of supplies, works & services used for projects and to respond to emergencies. This includes the flow of supplies from origin to destination but also more complex work of forecasting, optimising resources, value for money to ensure the most efficient process, and decreasing the carbon footprint of related operations"*

Type of waste in humanitarian context:

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COMMODITY TYPE	PACKAGING
Grains, cereals	*Virgin woven PP bags*
Cornmeal, fortified flour	*Hybrid paper bags and PP woven bags with PE*
Fortified vegetable oil	*Steel cans, plastic bottles, cardboard cartons*
Specialised nutritious food products	*Metallised flexible plastic sachets and pouches, plastic box liners, cardboard cartons*

TYPICAL NON-FOOD ITEMS
Tents, shelter kits, tarpaulin, synthetic sleeping mats, blankets, clothes, mosquito nets, timber, cement.
Nutrition-specialized products, such as Ready-to-Use Therapeutic Food (RUTF) and Ready-to-Use Supplementary Foods (RUSF); for example, Plumpy'Nut, vitamin A supplements, iron-folic acid supplements, and micronutrient supplements. These can be on tinplate or laminated packaging structures.
Medical supplies, wheelchairs, cold boxes.
Jerrycans/buckets (water containers), water purification tablets (Aquatabs, PUR), Water pumps, hygiene products (soap), menstrual hygiene products (single-use pads, reusable pads-ex. AFRIpads), water testing products, chemicals (such as chlorine), and equipment (for pump mechanics).
Stoves (fuel-efficient saving stoves), seeds, farming tools (hoes, axes, rakes, watering cans, buckets), storage (bags and sacks), fertilizers, pesticides, etc.
Paper, printed products, office equipment, electronic waste, etc.
Petroleum, oil, and lubricants. Electrical transformers with polychlorinated biphenyls (PCBs). Chemicals such as acid, chlorine, and pesticides. Asbestos-containing materials. Treated timber, etc.

Please indicate the link of the supply chain for which the solution can be applied? Describe how.

Identification of needs
Containers that can be used and discarded without worrying about waste problem
Conceptualization and planning
.....
Procurement – sourcing/ purchasing of products and services
.....
Goods collection in warehouses and repacking for transport to final destination
.....
Custom clearance
.....
Transport to the destination country (often multi-stage and using different modes of transport)
Air and road
Transport to the final destinations – last mile
Road
Storage at the final destination
No information on storage details
Operational logistic at final destination - distribution of goods and services
To be determined by local operatives

6. Rigid food packaging: thermoformed tray

Responsible partner: ITENE
INVESTIGATION LINE: I

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Research Executive Agency (REA). Neither the European Union nor the granting authority can be held responsible for them.

Solution 6 **not on the final List**	Rigid food packaging: thermoformed tray.
Product / service	x
Technology	-

I. Basic information

Description of functions
Material developed with improved composting behavior through the use of specific additives. Developed to offer home and industrial compostability and recyclability. It is processable on conventional equipment at lower temperatures than conventional materials like PET or PP.

Description of technology and TRL level (if applicable)
-

Description of product/service and TRL level (if applicable)
TRL = 8 (300 kg of compound processed into sheets and thermoformed at industrial facilities of B4P).

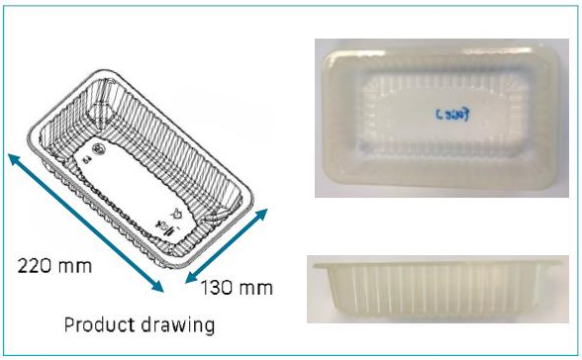
Basic conditions of use
Please include also minimum requirements of a given solution regarding the availability of public infrastructure.
NA
Please include the optimal scale/size of investment at which their solution or technology makes economic sense.
NA
What kind of waste the solution can utilize or valorise?
The material used for the tray is based on PLA, which can be produced from renewable sources.
To what extent does the use of a given solution or technology depend on climatic cconditions?
NA
Is it possible to refine the solution as an autonomous and mobile unit? (if applicable)
NA

Solution owner and his willingness to provide detailed technical and technological data
ITENE (SEALIVE project coordinator) and BIO4PACK

Has the Life Cycle Analysis been already done for this solution?
Yes

Source of data
ITENE internal communication.

References
Please include a description and a photo of any examples of the implementation.



Tray size: 220*130*50 mm depth. Sheet thickness: 450 µm

Source: *the web page of SEALIVE project*

II. End-of-life stage addressed by the solution

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Please describe if the solution refers to 4R Principle (Reduce, reuse, recycle, recover) biodegradability, composability or other means of end-of-life stage.
Both industrial and home compostable.

III. Needs of the humanitarian sector and / or of the solid waste management constraints in the humanitarian settings addressed by identified solution

We are looking for:
***1) bio - based products / services** in order to diminish the amounts of waste generated by humanitarian interventions*
***2) bio - based technologies** in order to cope with the amounts of waste generated in the humanitarian context.*

The expected characteristics of the bio-based solutions potentially applicable in the humanitarian context:
· ability to eliminate the humanitarian waste, i.e. plastic, aluminium, metal, glass, paper & cardboard, organic, wood, medical and chemical;
· sustainability – addressing environmental, economic, and social factors; be adaptable to local conditions; provide long-term benefits without unintended negative consequences;
· utilization of local resources and knowledge.

In case of a doubt as for the applicability of a given product, service or technology in the humanitarian context – please consult the Humanitarian Assessment Report prepared by People In Need and Polish Humanitarian Action. The Report is enclosed; also available in the SharePoint.

- *Please describe below how the solutions addresses the needs.*

Home compostability of food packaging residues

IV. Logistic supply chains application potential - in which stage?

***The 'humanitarian supply chain'** is defined as: "The planning, procurement, storage, transport and delivery of different forms of supplies, works & services used for projects and to respond to emergencies. This includes the flow of supplies from origin to destination but also more complex work of forecasting, optimising resources, value for money to ensure the most efficient process, and decreasing the carbon footprint of related operations"*

Type of waste in humanitarian context:

COMMODITY TYPE	***PACKAGING***
Grains, cereals	*Virgin woven PP bags*
Cornmeal, fortified flour	*Hybrid paper bags and PP woven bags with PE*
Fortified vegetable oil	*Steel cans, plastic bottles, cardboard cartons*
Specialised nutritious food products	*Metallised flexible plastic sachets and pouches, plastic box liners, cardboard cartons*

TYPICAL NON-FOOD ITEMS
Tents, shelter kits, tarpaulin, synthetic sleeping mats, blankets, clothes, mosquito nets, timber, cement.
Nutrition-specialized products, such as Ready-to-Use Therapeutic Food (RUTF) and Ready-to-Use Supplementary Foods (RUSF); for example, Plumpy'Nut, vitamin A supplements, iron-folic acid supplements, and micronutrient supplements. These can be on tinplate or laminated packaging structures.
Medical supplies, wheelchairs, cold boxes.
Jerrycans/buckets (water containers), water purification tablets (Aquatabs, PUR), Water pumps, hygiene products (soap), menstrual hygiene products (single-use pads, reusable pads-ex. AFRIpads), water testing products, chemicals (such as chlorine), and equipment (for pump mechanics).
Stoves (fuel-efficient saving stoves), seeds, farming tools (hoes, axes, rakes, watering cans, buckets), storage (bags and sacks), fertilizers, pesticides, etc.
Paper, printed products, office equipment, electronic waste, etc.
Petroleum, oil, and lubricants. Electrical transformers with polychlorinated biphenyls (PCBs). Chemicals such as acid, chlorine, and pesticides. Asbestos-containing materials. Treated timber, etc.

Please indicate the link of the supply chain for which the solution can be applied? Describe how.

Identification of needs

Funded by the European Union

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Conceptualization and planning
Procurement – sourcing/ purchasing of products and services
Goods collection in warehouses and repacking for transport to final destination
Custom clearance
Transport to the destination country (often multi-stage and using different modes of transport)
Transport to the final destinations – last mile
Storage at the final destination
Operational logistic at final destination - distribution of goods and services

7. Bowl Two piece (Pacovis AG)

Responsible partner: IBF
INVESTIGATION LINE: III

Solution 7 **not on the final List**	**Bowl Two piece (Pacovis AG)**
Product / service	*X*
Technology	
I. Basic information	
Description of functions *What is the effect or final product?* Water and heat-resistant, suitable for microwave ovens, oil and water-impermeable on the inside. The sugar cane is rolled and pressed in order to obtain the syrup. The fibres are ground into a fine paste with the addition of water and natural binders and then processed and pressed into moulds.	
Description of technology and TRL level (if applicable) Compostable according to DIN EN 13432 (suitable for industrial composting facilities) made from sugar cane. The sugar cane is rolled and pressed in order to obtain the syrup. The fibres are ground into a fine paste with the addition of water and natural binders and then processed and pressed into moulds.	

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Description of product/service and TRL level (if applicable)
Already on the market

Basic conditions of use
Please include also minimum requirements of a given solution regarding the availability of public infrastructure.
Please include the optimal scale/size of investment at which their solution or technology makes economic sense
What kind of waste the solution is able to utilize or valorise?
To what extent does the use of a given solution or technology depend on climatic conditions?
Is it possible to refine the solution as an autonomous and mobile unit? (if applicable)

.....

Solution owner and his willingness to provide detailed technical and technological data
Don't know

Has the Life Cycle Analysis been already done for this solution?
N/A

Source of data
https://www.biobasedconsultancy.com/en/database/bowl-twopiece,
Contacted but no response

References
Please include a description and a photo of any examples of the implementation.

Source: *the web page of Pacovis*

II. End-of-life stage addressed by the solution

Please describe if the solution refers to 4R Principle (Reduce, reuse, recycle, recover) biodegradability, composability or other means of end-of-life stage.

100% biodegradable

III. Needs of the humanitarian sector and / or of the solid waste management constraints in the humanitarian settings addressed by identified solution

We are looking for:
***1) bio - based products / services** in order to diminish the amounts of waste generated by humanitarian interventions*
***2) bio - based technologies** in order to cope with the amounts of waste generated in the humanitarian context.*

The expected characteristics of the bio-based solutions potentially applicable in the humanitarian context:
· ability to eliminate the humanitarian waste, i.e. plastic, aluminium, metal, glass, paper & cardboard, organic, wood, medical and chemical;
· sustainability – addressing environmental, economic, and social factors; be adaptable to local conditions; provide long-term benefits without unintended negative consequences;
· utilization of local resources and knowledge.

In case of a doubt as for the applicability of a given product, service or technology in the humanitarian context – please consult the Humanitarian Assessment Report prepared by People In Need and Polish Humanitarian Action. The Report is enclosed; also available in the SharePoint.

Please describe below how the solutions addresses the needs.

It will provide a waste solution.

IV. Logistic supply chains application potential - in which stage?

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The 'humanitarian supply chain' *is defined as: "The planning, procurement, storage, transport and delivery of different forms of supplies, works & services used for projects and to respond to emergencies. This includes the flow of supplies from origin to destination but also more complex work of forecasting, optimising resources, value for money to ensure the most efficient process, and decreasing the carbon footprint of related operations"*

Type of waste in humanitarian context:

COMMODITY TYPE	***PACKAGING***
Grains, cereals	*Virgin woven PP bags*
Cornmeal, fortified flour	*Hybrid paper bags and PP woven bags with PE*
Fortified vegetable oil	*Steel cans, plastic bottles, cardboard cartons*
Specialised nutritious food products	*Metallised flexible plastic sachets and pouches, plastic box liners, cardboard cartons*

TYPICAL NON-FOOD ITEMS
Tents, shelter kits, tarpaulin, synthetic sleeping mats, blankets, clothes, mosquito nets, timber, cement.
Nutrition-specialized products, such as Ready-to-Use Therapeutic Food (RUTF) and Ready-to-Use Supplementary Foods (RUSF); for example, Plumpy'Nut, vitamin A supplements, iron-folic acid supplements, and micronutrient supplements. These can be on tinplate or laminated packaging structures.
Medical supplies, wheelchairs, cold boxes.
Jerrycans/buckets (water containers), water purification tablets (Aquatabs, PUR), Water pumps, hygiene products (soap), menstrual hygiene products (single-use pads, reusable pads-ex. AFRIpads), water testing products, chemicals (such as chlorine), and equipment (for pump mechanics).
Stoves (fuel-efficient saving stoves), seeds, farming tools (hoes, axes, rakes, watering cans, buckets), storage (bags and sacks), fertilizers, pesticides, etc.
Paper, printed products, office equipment, electronic waste, etc.
Petroleum, oil, and lubricants. Electrical transformers with polychlorinated biphenyls (PCBs). Chemicals such as acid, chlorine, and pesticides. Asbestos-containing materials. Treated timber, etc.

Please indicate the link of the supply chain for which the solution can be applied? Describe how.

Identification of needs

Kitchen equipment, household and domestic items and catering supplies

Conceptualization and planning

.....

Procurement – sourcing/ purchasing of products and services

.....

Goods collection in warehouses and repacking for transport to final destination

.....

Custom clearance

.....

Transport to the destination country (often multi-stage and using different modes of transport)

Air and road transport

Transport to the final destinations – last mile

Very light material, should not take much effort

Storage at the final destination

No particular information on how the product should be stored.

Operational logistic at final destination - distribution of goods and services

The material is quite light.

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8. Bioplastics for food packaging with shelf-life properties

Responsible partner: ITENE
INVESTIGATION LINE: I

Solution 8 **not on the final List**	**Bioplastics for food packaging with shelf-life properties**
Product / service	X
Technology	X

I. Basic information

Description of functions
What is the effect or final product?
Bioplastics for food packaging with shelf-life properties, biodegradable bioplastics from sewage sludge.

Description of technology and TRL level (if applicable)
TRL 5-6 (validation in relevant environment).

Description of product/service and TRL level (if applicable)
Product: TRL 5-6 (validation in relevant environment).

Basic conditions of use
Please include also minimum requirements of a given solution regarding the availability of public infrastructure.
Please include the optimal scale/size of investment at which their solution or technology makes economic sense.
Not commercialised yet, not estimated.
What kind of waste the solution is able to utilize or valorise?
Industrial waste (e.g. food processing waste).
To what extent does the use of a given solution or technology depend on climatic conditions?
Not affected.
Is it possible to refine the solution as an autonomous and mobile unit? (if applicable)
Could be.

Solution owner and his willingness to provide detailed technical and technological data
Alma Mater Studiorum University of Bologna, willing to provide more information on the solution.

Has the Life Cycle Analysis been already done for this solution?
Yes. Confidential information.

Source of data
Response to online survey on November 27th.

References
Please include a description and a photo of any examples of the implementation.

.....

II. End-of-life stage addressed by the solution

Please describe if the solution refers to 4R Principle (Reduce, reuse, recycle, recover) biodegradability, composability or other means of end-of-life stage.
Biodegradable bio-based product solution.

III. Needs of the humanitarian sector and / or of the solid waste management constraints in the humanitarian settings addressed by identified solution

We are looking for:
***1) bio - based products / services** in order to diminish the amounts of waste generated by humanitarian interventions*
***2) bio - based technologies** in order to cope with the amounts of waste generated in the humanitarian context.*

The expected characteristics of the bio-based solutions potentially applicable in the humanitarian context:

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· *ability to eliminate the humanitarian waste, i.e. plastic, aluminium, metal, glass, paper & cardboard, organic, wood, medical and chemical;*
· *sustainability – addressing environmental, economic, and social factors; be adaptable to local conditions; provide long-term benefits without unintended negative consequences;*
· *utilization of local resources and knowledge.*

In case of a doubt as for the applicability of a given product, service or technology in the humanitarian context – please consult the Humanitarian Assessment Report prepared by People In Need and Polish Humanitarian Action. The Report is enclosed; also available in the SharePoint.

Please describe below how the solutions addresses the needs.
Reduction of post-consumer waste. Use of waste/by-products as raw material to produce plastics, embracing a circular approach.

IV. Logistic supply chains application potential - in which stage?

The 'humanitarian supply chain' *is defined as: "The planning, procurement, storage, transport and delivery of different forms of supplies, works & services used for projects and to respond to emergencies. This includes the flow of supplies from origin to destination but also more complex work of forecasting, optimising resources, value for money to ensure the most efficient process, and decreasing the carbon footprint of related operations"*

Type of waste in humanitarian context:

COMMODITY TYPE	***PACKAGING***
Grains, cereals	*Virgin woven PP bags*
Cornmeal, fortified flour	*Hybrid paper bags and PP woven bags with PE*
Fortified vegetable oil	*Steel cans, plastic bottles, cardboard cartons*
Specialised nutritious food products	*Metallised flexible plastic sachets and pouches, plastic box liners, cardboard cartons*

TYPICAL NON-FOOD ITEMS
Tents, shelter kits, tarpaulin, synthetic sleeping mats, blankets, clothes, mosquito nets, timber, cement.
Nutrition-specialized products, such as Ready-to-Use Therapeutic Food (RUTF) and Ready-to-Use Supplementary Foods (RUSF); for example, Plumpy'Nut, vitamin A supplements, iron-folic acid supplements, and micronutrient supplements. These can be on tinplate or laminated packaging structures.
Medical supplies, wheelchairs, cold boxes.
Jerrycans/buckets (water containers), water purification tablets (Aquatabs, PUR), Water pumps, hygiene products (soap), menstrual hygiene products (single-use pads, reusable pads-ex. AFRIpads), water testing products, chemicals (such as chlorine), and equipment (for pump mechanics).
Stoves (fuel-efficient saving stoves), seeds, farming tools (hoes, axes, rakes, watering cans, buckets), storage (bags and sacks), fertilizers, pesticides, etc.
Paper, printed products, office equipment, electronic waste, etc.
Petroleum, oil, and lubricants. Electrical transformers with polychlorinated biphenyls (PCBs). Chemicals such as acid, chlorine, and pesticides. Asbestos-containing materials. Treated timber, etc.

Please indicate the link of the supply chain for which the solution can be applied? Describe how.

Identification of needs

.....

Conceptualization and planning

.....

Procurement – sourcing/ purchasing of products and services

.....

Goods collection in warehouses and repacking for transport to final destination

.....

Custom clearance

.....

Transport to the destination country (often multi-stage and using different modes of transport)

Funded by the European Union

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.....
Transport to the final destinations – last mile
.....
Storage at the final destination
.....
Operational logistic at final destination - distribution of goods and services
.....

9. Board trays, flexible paper packaging, among others

Responsible partner: ITENE
INVESTIGATION LINE: I

Solution 9 **not on the final List**	**Board trays, flexible paper packaging, among others.**
Product / service	X
Technology	

I. Basic information

Description of functions
What is the effect or final product?
Board trays, flexible paper packaging, among other products based on cellulose.

Description of technology and TRL level (if applicable)
.....

Description of product/service and TRL level (if applicable)
Product: TRL 9 (commercial product).

Basic conditions of use
Please include also minimum requirements of a given solution regarding the availability of public infrastructure.
Please include the optimal scale/size of investment at which their solution or technology makes economic sense
What kind of waste the solution is able to utilize or valorise?
Solid urban biowaste (e.g. household organic waste)
To what extent does the use of a given solution or technology depend on climatic conditions?
Not affected.
Is it possible to refine the solution as an autonomous and mobile unit? (if applicable)
.....

Solution owner and his willingness to provide detailed technical and technological data
Graphic Packaging International.

Has the Life Cycle Analysis been already done for this solution?
Yes. Confidential information.

Source of data
Response to online survey on December 12th.

References
Please include a description and a photo of any examples of the implementation.

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Source: *the web page of Graphic Packaging International*

Graphic Packaging has a large portfolio of packaging products targeting several markets (beverages, food, personal care, etc.). They have product designs that replace plastic ring tops (KeelClip), provide alternative to plastic tubs, glass jars and metal containers (Boardio), replace high-barrier plastic materials (PaperSeal) and offer recyclable alternatives to PP and APET (amorphous PET).

II. End-of-life stage addressed by the solution

Please describe if the solution refers to 4R Principle (Reduce, reuse, recycle, recover) biodegradability, composability or other means of end-of-life stage.
Recyclable and compostable bio-based product solution.

III. Needs of the humanitarian sector and / or of the solid waste management constraints in the humanitarian settings addressed by identified solution

We are looking for:
1) bio - based products / services *in order to diminish the amounts of waste generated by humanitarian interventions*
2) bio - based technologies *in order to cope with the amounts of waste generated in the humanitarian context.*

The expected characteristics of the bio-based solutions potentially applicable in the humanitarian context:
· ability to eliminate the humanitarian waste, i.e. plastic, aluminium, metal, glass, paper & cardboard, organic, wood, medical and chemical;
· sustainability – addressing environmental, economic, and social factors; be adaptable to local conditions; provide long-term benefits without unintended negative consequences;
· utilization of local resources and knowledge.

In case of a doubt as for the applicability of a given product, service or technology in the humanitarian context – please consult the Humanitarian Assessment Report prepared by People In Need and Polish Humanitarian Action. The Report is enclosed; also available in the SharePoint.

Please describe below how the solutions addresses the needs.
Compostable, recyclable packaging solutions.

IV. Logistic supply chains application potential - in which stage?

The 'humanitarian supply chain' *is defined as: "The planning, procurement, storage, transport and delivery of different forms of supplies, works & services used for projects and to respond to emergencies. This includes the flow of supplies from origin to destination but also more complex work of forecasting, optimising resources, value for money to ensure the most efficient process, and decreasing the carbon footprint of related operations"*

Type of waste in humanitarian context:

COMMODITY TYPE	***PACKAGING***
Grains, cereals	*Virgin woven PP bags*
Cornmeal, fortified flour	*Hybrid paper bags and PP woven bags with PE*
Fortified vegetable oil	*Steel cans, plastic bottles, cardboard cartons*
Specialised nutritious food products	*Metallised flexible plastic sachets and pouches, plastic box liners, cardboard cartons*
TYPICAL NON-FOOD ITEMS	
Tents, shelter kits, tarpaulin, synthetic sleeping mats, blankets, clothes, mosquito nets, timber, cement.	

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Nutrition-specialized products, such as Ready-to-Use Therapeutic Food (RUTF) and Ready-to-Use Supplementary Foods (RUSF); for example, Plumpy'Nut, vitamin A supplements, iron-folic acid supplements, and micronutrient supplements. These can be on tinplate or laminated packaging structures.
Medical supplies, wheelchairs, cold boxes.
Jerrycans/buckets (water containers), water purification tablets (Aquatabs, PUR), Water pumps, hygiene products (soap), menstrual hygiene products (single-use pads, reusable pads-ex. AFRIpads), water testing products, chemicals (such as chlorine), and equipment (for pump mechanics).
Stoves (fuel-efficient saving stoves), seeds, farming tools (hoes, axes, rakes, watering cans, buckets), storage (bags and sacks), fertilizers, pesticides, etc.
Paper, printed products, office equipment, electronic waste, etc.
Petroleum, oil, and lubricants. Electrical transformers with polychlorinated biphenyls (PCBs). Chemicals such as acid, chlorine, and pesticides. Asbestos-containing materials. Treated timber, etc.

Please indicate the link of the supply chain for which the solution can be applied? Describe how.

Identification of needs
Recycled paperboard, compostable containers for food, personal care, healthcare, etc.
Conceptualization and planning
.....
Procurement – sourcing/ purchasing of products and services
.....
Goods collection in warehouses and repacking for transport to final destination
.....
Custom clearance
.....
Transport to the destination country (often multi-stage and using different modes of transport)
.....
Transport to the final destinations – last mile
.....
Storage at the final destination
.....
Operational logistic at final destination - distribution of goods and services
.....

10. KELPI fresh fruit packaging

Responsible partner: PRO CIVIS
INVESTIGATION LINE: IV

Solution 10 **not on the final List**	**KELPI fresh fruit packaging**

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Product / service	**X**
Technology	**-**

I. Basic information

Description of functions

Plastic packaging is used by the fresh produce industry throughout the world, however pollution caused by waste plastics is a growing problem, particularly in regions with limited waste management infrastructure as well as more generally across the globe. Only 9 % of all fossil fuel plastic waste ever produced has been recycled. 12 % has been incinerated and the remaining 79 % is dumped in landfills or polluting the environment (*Ellen MacArthur Foundation*).

KELPI's unique packaging solution harnesses the properties of seaweed to create recyclable, compostable, marine-safe, low carbon bio-material packaging. **KELPI's biopolymer material** delivers a long-term water and acid barrier and by 2025 shall be applied with a view to achieving sustainable fresh cut fruit packaging solutions.

Description of technology and TRL level (if applicable)

-

Description of product/service and TRL level (if applicable)

KELPI's materials team is currently working to prototype and pilot bio-material packaging solutions for plastic free packaging to be brought to market in 2025.

Basic conditions of use

Please include also minimum requirements of a given solution regarding the availability of public infrastructure.

No.

Please include the optimal scale/size of investment at which their solution or technology makes economic sense.

Non applicable.

What kind of waste the solution is able to utilize or valorise?

Non applicable.

To what extent does the use of a given solution or technology depend on climatic conditions?

It does not.

Is it possible to refine the solution as an autonomous and mobile unit? (if applicable)

Non applicable.

Solution owner and his willingness to provide detailed technical and technological data

KELP INDUSTRIES LTD
Registered office: Science Creates Old Market, Midland Road, Bristol, England.

Has the Life Cycle Analysis been already done for this solution?

In the process of finding out.
KELPI uses only renewable feedstocks, sourcing seaweed farmed sustainably, ensuring a positive impact upon the environment as seaweed sequesters huge amounts of carbon dioxide as it grows, deacidifying the ocean and providing a rich environment for fish.

Source of data

- The list of winners of Tech Tour Bio-based Awards 2023: https://techtour.com/news/2023/biobased-industries-awards-winners-2023.html

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- The web page: https://www.kelpi.net/
- Contact over the mail address: hello@kelpi.net

References

Please include a description and a photo of any examples of the implementation.

KELPI has won a new contract (March 2024) with global fresh fruit producer Blue Skies and their supermarket client Waitrose, with a view to eventually eliminating plastic packaging and replacing it with seaweed-derived alternatives.

KELPI is working with Blue Skies, with support from Waitrose, to revolutionize fresh cut fruit packaging in an 18-month project funded by FRESHPPACT, a UK Aid supported project.

Source: *the web page of KELPI INDUSTRIES LTD*

II. End-of-life stage addressed by the solution

Please describe if the solution refers to 4R Principle (Reduce, reuse, recycle, recover) biodegradability, composability or other means of end-of-life stage.

The solution refers to the reduction of plastic packaging waste.

The proposed solution has a recyclable character.

III. Needs of the humanitarian sector and / or of the solid waste management constraints in the humanitarian settings addressed by identified solution

We are looking for:
***1) bio - based products / services** in order to diminish the amounts of waste generated by humanitarian interventions*
***2) bio - based technologies** in order to cope with the amounts of waste generated in the humanitarian context.*

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The expected characteristics of the bio-based solutions potentially applicable in the humanitarian context:
· ability to eliminate the humanitarian waste, i.e. plastic, aluminium, metal, glass, paper & cardboard, organic, wood, medical and chemical;
· sustainability – addressing environmental, economic, and social factors; be adaptable to local conditions; provide long-term benefits without unintended negative consequences;
· utilization of local resources and knowledge.

In case of a doubt as for the applicability of a given product, service or technology in the humanitarian context – please consult the Humanitarian Assessment Report prepared by People In Need and Polish Humanitarian Action. The Report is enclosed; also available in the SharePoint.

- *Please describe below how the solutions addresses the needs.*

KELPI's sustainable materials innovation harnesses the properties of seaweed to create compostable, marine-safe, low-carbon packaging.

KELPI's bio-material is unique in matching or even exceeding the performance of plastic, in particular with a strong water barrier and resistance to greasy contents or acidic foods.

KELPI's bio-material packaging solutions for plastic free packaging aim at reducing plastic waste across the fresh produce supply chain from Sub-Saharan Africa to the UK and Europe.

IV. Logistic supply chains application potential - in which stage?

The 'humanitarian supply chain' *is defined as: "The planning, procurement, storage, transport and delivery of different forms of supplies, works & services used for projects and to respond to emergencies. This includes the flow of supplies from origin to destination but also more complex work of forecasting, optimising resources, value for money to ensure the most efficient process, and decreasing the carbon footprint of related operations"*

Type of waste in humanitarian context:

COMMODITY TYPE	***PACKAGING***
Grains, cereals	*Virgin woven PP bags*
Cornmeal, fortified flour	*Hybrid paper bags and PP woven bags with PE*
Fortified vegetable oil	*Steel cans, plastic bottles, cardboard cartons*
Specialised nutritious food products	*Metallised flexible plastic sachets and pouches, plastic box liners, cardboard cartons*

TYPICAL NON-FOOD ITEMS
Tents, shelter kits, tarpaulin, synthetic sleeping mats, blankets, clothes, mosquito nets, timber, cement.
Nutrition-specialized products, such as Ready-to-Use Therapeutic Food (RUTF) and Ready-to-Use Supplementary Foods (RUSF); for example, Plumpy'Nut, vitamin A supplements, iron-folic acid supplements, and micronutrient supplements. These can be on tinplate or laminated packaging structures.
Medical supplies, wheelchairs, cold boxes.
Jerrycans/buckets (water containers), water purification tablets (Aquatabs, PUR), Water pumps, hygiene products (soap), menstrual hygiene products (single-use pads, reusable pads-ex. AFRIpads), water testing products, chemicals (such as chlorine), and equipment (for pump mechanics).
Stoves (fuel-efficient saving stoves), seeds, farming tools (hoes, axes, rakes, watering cans, buckets), storage (bags and sacks), fertilizers, pesticides, etc.
Paper, printed products, office equipment, electronic waste, etc.
Petroleum, oil, and lubricants. Electrical transformers with polychlorinated biphenyls (PCBs). Chemicals such as acid, chlorine, and pesticides. Asbestos-containing materials. Treated timber, etc.

Please indicate the link of the supply chain for which the solution can be applied? Describe how.

Identification of needs

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……
Conceptualization and planning
……
Procurement – sourcing/ purchasing of products and services
……
Goods collection in warehouses and repacking for transport to final destination
Potential application.
Custom clearance
……
Transport to the destination country (often multi-stage and using different modes of transport)
……
Transport to the final destinations – last mile
Potential application.
Storage at the final destination
Potential application.
Operational logistic at final destination - distribution of goods and services
Potential application.

11. Flora Food's wet fibre moulded tub for plant-based spreads

Responsible partner: PRO CIVIS
INVESTIGATION LINE: IV

Solution 11 **not on the final List**	**Flora Food's wet fibre moulded tub for plant-based spreads**
Product / service	**X**
Technology	**-**
I. Basic information	
Description of functions **Flora Food** is pioneering new paper tub packaging for spreads like Flora, made from compressed wet paper fibers, that is plastic-free, oil-resistant and fully recyclable. **Flora Food's** plastic-free, oil-resistant, and waterproof wet fibre moulded tub for plant-based spreads uses paper from a PEFC-certified supplier (sustainable sourcing) and has received Conventional Plastic Free Certification.	

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The pack is described as the first oil-resistant paper tub for plant-based spreads. The new paper-based packaging is robust while maintaining the qualities of the taste.

Description of technology and TRL level (if applicable)

TRL 9

Description of product/service and TRL level (if applicable)

-

Basic conditions of use

Please include also minimum requirements of a given solution regarding the availability of public infrastructure.

Non.

Please include the optimal scale/size of investment at which their solution or technology makes economic sense.

Non applicable.

What kind of waste the solution is able to utilize or valorise?

Non applicable.

To what extent does the use of a given solution or technology depend on climatic conditions?

No dependence.

Is it possible to refine the solution as an autonomous and mobile unit? (if applicable)

Non applicable.

Solution owner and his willingness to provide detailed technical and technological data

Flora Food Group BV, Beethovenstraat 551, 1083 HK Amsterdam, Netherlands.

Has the Life Cycle Analysis been already done for this solution?

At the official web page - the Company stresses that it tracks and measures its own commitment to reduce the carbon footprint by conducting Life Cycle Assessments (LCAs) on the impact of the packing, in order to communicate with consumers about lower-impact packaging materials to encourage sustainable consumption.

The presence / availability of the LCA for the fibre-based tubes – in the process of finding out.

Source of data

- The winners of the sustainability awards of the Sustainable Packaging Summit 2024: https://packagingeurope.com/news/winners-of-the-sustainability-awards-2024-announced/12109.article
- Contact with the Flora Food Group over the web formula.
- Contact with Viviana Fucinos Manrique - Global R&D Operations Manager (in the process of establishing via LinkedIn).
- Current contact over the mail addresses:
  info@florafg.com
  medialine@florafg.com
  compliance@florafg.com

References

Please include a description and a photo of any examples of the implementation.

The process to develop the new paper packaging has taken approximately four years. **Flora Food** tested hundreds of prototypes to arrive at a solution that allows

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to overcome the challenges of oil-based products and launch the new paper tub.

Source: *the web page of Flora Food Group BV*

II. End-of-life stage addressed by the solution

Please describe if the solution refers to 4R Principle (Reduce, reuse, recycle, recover) biodegradability, composability or other means of end-of-life stage.

Reduction of plastic waste.

This plastic-free, oil-resistant paper tub is mono-material and therefore fully recyclable.

It does not have a plastic liner, meaning it can be cleaned, dried, and recycled alongside paper and cardboard household waste.

The tubs have received recyclability Class A certification which means they are fully compatible with recycling processes and can be recycled along with other paper and cardboard household waste.

III. Needs of the humanitarian sector and / or of the solid waste management constraints in the humanitarian settings addressed by identified solution

We are looking for:
***1) bio - based products / services** in order to diminish the amounts of waste generated by humanitarian interventions*
***2) bio - based technologies** in order to cope with the amounts of waste generated in the humanitarian context.*

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The expected characteristics of the bio-based solutions potentially applicable in the humanitarian context:
· ability to eliminate the humanitarian waste, i.e. plastic, aluminium, metal, glass, paper & cardboard, organic, wood, medical and chemical;
· sustainability – addressing environmental, economic, and social factors; be adaptable to local conditions; provide long-term benefits without unintended negative consequences;
· utilization of local resources and knowledge.

In case of a doubt as for the applicability of a given product, service or technology in the humanitarian context – please consult the Humanitarian Assessment Report prepared by People In Need and Polish Humanitarian Action. The Report is enclosed; also available in the SharePoint.

- *Please describe below how the solutions addresses the needs.*

The new **Flora Food** paper tubs are plastic-free, recyclable, and made from renewable materials. This allows to eliminate plastic waste while embracing a more sustainable solution. The paper tubs are also durable, oil resistant, food safe and maintain the quality and freshness of the products.

Flora Food plans to replace up to two billion plastic tubs with paper-based alternatives by 2030, thus phasing out over 25,000 tons of plastic waste annually.

IV. Logistic supply chains application potential - in which stage?

The 'humanitarian supply chain' *is defined as: "The planning, procurement, storage, transport and delivery of different forms of supplies, works & services used for projects and to respond to emergencies. This includes the flow of supplies from origin to destination but also more complex work of forecasting, optimising resources, value for money to ensure the most efficient process, and decreasing the carbon footprint of related operations"*

Type of waste in humanitarian context:

COMMODITY TYPE	***PACKAGING***
Grains, cereals	*Virgin woven PP bags*
Cornmeal, fortified flour	*Hybrid paper bags and PP woven bags with PE*
Fortified vegetable oil	*Steel cans, plastic bottles, cardboard cartons*
Specialised nutritious food products	*Metallised flexible plastic sachets and pouches, plastic box liners, cardboard cartons*

TYPICAL NON-FOOD ITEMS
Tents, shelter kits, tarpaulin, synthetic sleeping mats, blankets, clothes, mosquito nets, timber, cement.
Nutrition-specialized products, such as Ready-to-Use Therapeutic Food (RUTF) and Ready-to-Use Supplementary Foods (RUSF); for example, Plumpy'Nut, vitamin A supplements, iron-folic acid supplements, and micronutrient supplements. These can be on tinplate or laminated packaging structures.
Medical supplies, wheelchairs, cold boxes.
Jerrycans/buckets (water containers), water purification tablets (Aquatabs, PUR), Water pumps, hygiene products (soap), menstrual hygiene products (single-use pads, reusable pads-ex. AFRIpads), water testing products, chemicals (such as chlorine), and equipment (for pump mechanics).
Stoves (fuel-efficient saving stoves), seeds, farming tools (hoes, axes, rakes, watering cans, buckets), storage (bags and sacks), fertilizers, pesticides, etc.
Paper, printed products, office equipment, electronic waste, etc.
Petroleum, oil, and lubricants. Electrical transformers with polychlorinated biphenyls (PCBs). Chemicals such as acid, chlorine, and pesticides. Asbestos-containing materials. Treated timber, etc.

Please indicate the link of the supply chain for which the solution can be applied? Describe how.

Identification of needs

.....

Conceptualization and planning

.....

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Procurement – sourcing/ purchasing of products and services
Potential application.
Goods collection in warehouses and repacking for transport to final destination
……
Custom clearance
……
Transport to the destination country (often multi-stage and using different modes of transport)
……
Transport to the final destinations – last mile
……
Storage at the final destination
……
Operational logistic at final destination - distribution of goods and services
Potential application.

12. Biodegradable Paper Cup Hot Drink (Staples Europe BV)

Responsible partner: IBF
INVESTIGATION LINE: III

Solution 12 **not on the final List**	**Biodegradable Paper Cup Hot Drink (Staples Europe BV)**
Product / service	*X*
Technology	

I. Basic information

Description of functions
What is the effect or final product?
Disposable paper cup for hot and cold drinks

Description of technology and TRL level (if applicable)
N/A

Description of product/service and TRL level (if applicable)
It is food-safe and the baseboard and coating are based on renewable maerials. The product is compostable in industrial composting and can be collected together with food waste in most collecting schemes.

Basic conditions of use
Please include also minimum requirements of a given solution regarding the availability of public infrastructure.
Please include the optimal scale/size of investment at which their solution or technology makes economic sense
What kind of waste the solution is able to utilize or valorise?
To what extent does the use of a given solution or technology depend on climatic conditions?
Is it possible to refine the solution as an autonomous and mobile unit? (if applicable)

The product is part of a range of biobased products. Freezer/fridge

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☐ Room temperature (up to 40°C for more than 24 hrs)
☐ Hot-fill (heating up to 70°C for up to 2 h or up to 100°C for 15 minutes)

Solution owner and his willingness to provide detailed technical and technological data
StoraEnso, contacted but no response

Has the Life Cycle Analysis been already done for this solution?
N/A

Source of data
https://www.biobasedconsultancy.com/en/database/biodegradable-paper-cup-hot-drinks-design-print-250ml280ml9oz,

References
Please include a description and a photo of any examples of the implementation.

Source: *the web page of Stora Enso*

II. End-of-life stage addressed by the solution

Please describe if the solution refers to 4R Principle (Reduce, reuse, recycle, recover) biodegradability, composability or other means of end-of-life stage.

80% bio based product so should be recycled and recovered.

III. Needs of the humanitarian sector and / or of the solid waste management constraints in the humanitarian settings addressed by identified solution

We are looking for:
1) bio - based products / services *in order to diminish the amounts of waste generated by humanitarian interventions*
2) bio - based technologies *in order to cope with the amounts of waste generated in the humanitarian context.*

The expected characteristics of the bio-based solutions potentially applicable in the humanitarian context:
- *ability to eliminate the humanitarian waste, i.e. plastic, aluminium, metal, glass, paper & cardboard, organic, wood, medical and chemical;*
- *sustainability – addressing environmental, economic, and social factors; be adaptable to local conditions; provide long-term benefits without unintended negative consequences;*
- *utilization of local resources and knowledge.*

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In case of a doubt as for the applicability of a given product, service or technology in the humanitarian context – please consult the Humanitarian Assessment Report prepared by People In Need and Polish Humanitarian Action. The Report is enclosed; also available in the SharePoint.

Please describe below how the solutions addresses the needs.

It is 80% bio based and can be recycled according to declaration of compliance.

IV. Logistic supply chains application potential - in which stage?

The 'humanitarian supply chain' *is defined as: "The planning, procurement, storage, transport and delivery of different forms of supplies, works & services used for projects and to respond to emergencies. This includes the flow of supplies from origin to destination but also more complex work of forecasting, optimising resources, value for money to ensure the most efficient process, and decreasing the carbon footprint of related operations"*

Type of waste in humanitarian context:

COMMODITY TYPE	***PACKAGING***
Grains, cereals	*Virgin woven PP bags*
Cornmeal, fortified flour	*Hybrid paper bags and PP woven bags with PE*
Fortified vegetable oil	*Steel cans, plastic bottles, cardboard cartons*
Specialised nutritious food products	*Metallised flexible plastic sachets and pouches, plastic box liners, cardboard cartons*

TYPICAL NON-FOOD ITEMS
Tents, shelter kits, tarpaulin, synthetic sleeping mats, blankets, clothes, mosquito nets, timber, cement.
Nutrition-specialized products, such as Ready-to-Use Therapeutic Food (RUTF) and Ready-to-Use Supplementary Foods (RUSF); for example, Plumpy'Nut, vitamin A supplements, iron-folic acid supplements, and micronutrient supplements. These can be on tinplate or laminated packaging structures.
Medical supplies, wheelchairs, cold boxes.
Jerrycans/buckets (water containers), water purification tablets (Aquatabs, PUR), Water pumps, hygiene products (soap), menstrual hygiene products (single-use pads, reusable pads-ex. AFRIpads), water testing products, chemicals (such as chlorine), and equipment (for pump mechanics).
Stoves (fuel-efficient saving stoves), seeds, farming tools (hoes, axes, rakes, watering cans, buckets), storage (bags and sacks), fertilizers, pesticides, etc.
Paper, printed products, office equipment, electronic waste, etc.
Petroleum, oil, and lubricants. Electrical transformers with polychlorinated biphenyls (PCBs). Chemicals such as acid, chlorine, and pesticides. Asbestos-containing materials. Treated timber, etc.

Please indicate the link of the supply chain for which the solution can be applied? Describe how.

Identification of needs

.....

Conceptualization and planning

.....

Procurement – sourcing/ purchasing of products and services

.....

Goods collection in warehouses and repacking for transport to final destination

.....

Custom clearance

.....

Transport to the destination country (often multi-stage and using different modes of transport)

Will be more than likely multi-stage from manufacturer to humanitarian setting involving air and road travel. Can be transported easily

Transport to the final destinations – last mile

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Quite easy to be transported by road or through difficult terrain as light
Storage at the final destination
Mo information on storage details
Operational logistic at final destination - distribution of goods and services
Yes

13. Huhtamaki's 100% wood fiber cup

Responsible partner: PRO CIVIS
INVESTIGATION LINE: IV

Solution 13 **not on the final List**	**Huhtamaki's 100% wood fiber cup**
Product / service	**X**
Technology	**-**

I. Basic information

Description of functions

The Product is a specifically engineered **Sundae Cup & Lid** that has been developed in partnership with Havi for McDonald's to be used throughout Europe initially. **The Cup** is made from 100% wood fiber, without any plastic additives. **The Cup** has been engineered to very high-performance tolerances and demonstrate superior functionality.

Description of technology and TRL level (if applicable)

-

Description of product/service and TRL level (if applicable)

TRL 9.

Basic conditions of use

Please include also minimum requirements of a given solution regarding the availability of public infrastructure.

No requirements.

Please include the optimal scale/size of investment at which their solution or technology makes economic sense.

Non applicable.

What kind of waste the solution is able to utilize or valorise?

The solution provides for the reduction of plastics.

To what extent does the use of a given solution or technology depend on climatic conditions?

Non applicable.

Is it possible to refine the solution as an autonomous and mobile unit? (if applicable)

Non applicable.

Solution owner and his willingness to provide detailed technical and technological data

HUHTAMAKI, Finland

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The openness for further exchange of information – not known at the moment, the correspondence goes over the Media Department at Huhtamaki.

Has the Life Cycle Analysis been already done for this solution?

In the process of finding out.

Source of data

- The Company's presence at the Sustainable Packaging Summit, Amsterdam, Netherlands.
  - **The Cup** has been selected as the Sustainability Awards 2021 finalist.
- The web page: https://packagingeurope.com/sustainability-awards/about-the-awards
- The current mail contact over the mail address communications@huhtamaki.com and the web form.

References

Please include a description and a photo of any examples of the implementation.

Source: *the web page of Huhtamaki*

II. End-of-life stage addressed by the solution

Please describe if the solution refers to 4R Principle (Reduce, reuse, recycle, recover) biodegradability, composability or other means of end-of-life stage.

Recover. Recycle.

III. Needs of the humanitarian sector and / or of the solid waste management constraints in the humanitarian settings addressed by identified solution

We are looking for:
***1) bio - based products / services** in order to diminish the amounts of waste generated by humanitarian interventions*
***2) bio - based technologies** in order to cope with the amounts of waste generated in the humanitarian context.*

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The expected characteristics of the bio-based solutions potentially applicable in the humanitarian context:
· ability to eliminate the humanitarian waste, i.e. plastic, aluminium, metal, glass, paper & cardboard, organic, wood, medical and chemical;
· sustainability – addressing environmental, economic, and social factors; be adaptable to local conditions; provide long-term benefits without unintended negative consequences;
· utilization of local resources and knowledge.

In case of a doubt as for the applicability of a given product, service or technology in the humanitarian context – please consult the Humanitarian Assessment Report prepared by People In Need and Polish Humanitarian Action. The Report is enclosed; also available in the SharePoint.

Please describe below how the solutions addresses the needs.

The initial need for coming up with **the Cup** was to replace existing plastic package made from non-renewable materials. The circular design addresses the consumer (and increasingly legislative) demand for a switch to renewable materials by using tree fiber from sustainably managed forests, utilising efficient manufacturing processes that reprocess all scrap and wastage and ending with a consumer and operator validated package that can be recovered in existing paper streams, have the high-value material within it captured, and then recycled.

IV. Logistic supply chains application potential - in which stage?

The 'humanitarian supply chain' *is defined as: "The planning, procurement, storage, transport and delivery of different forms of supplies, works & services used for projects and to respond to emergencies. This includes the flow of supplies from origin to destination but also more complex work of forecasting, optimising resources, value for money to ensure the most efficient process, and decreasing the carbon footprint of related operations"*

Type of waste in humanitarian context:

COMMODITY TYPE	***PACKAGING***
Grains, cereals	*Virgin woven PP bags*
Cornmeal, fortified flour	*Hybrid paper bags and PP woven bags with PE*
Fortified vegetable oil	*Steel cans, plastic bottles, cardboard cartons*
Specialised nutritious food products	*Metallised flexible plastic sachets and pouches, plastic box liners, cardboard cartons*
TYPICAL NON-FOOD ITEMS	
Tents, shelter kits, tarpaulin, synthetic sleeping mats, blankets, clothes, mosquito nets, timber, cement.	
Nutrition-specialized products, such as Ready-to-Use Therapeutic Food (RUTF) and Ready-to-Use Supplementary Foods (RUSF); for example, Plumpy'Nut, vitamin A supplements, iron-folic acid supplements, and micronutrient supplements. These can be on tinplate or laminated packaging structures.	
Medical supplies, wheelchairs, cold boxes.	
Jerrycans/buckets (water containers), water purification tablets (Aquatabs, PUR), Water pumps, hygiene products (soap), menstrual hygiene products (single-use pads, reusable pads-ex. AFRIpads), water testing products, chemicals (such as chlorine), and equipment (for pump mechanics).	
Stoves (fuel-efficient saving stoves), seeds, farming tools (hoes, axes, rakes, watering cans, buckets), storage (bags and sacks), fertilizers, pesticides, etc.	
Paper, printed products, office equipment, electronic waste, etc.	
Petroleum, oil, and lubricants. Electrical transformers with polychlorinated biphenyls (PCBs). Chemicals such as acid, chlorine, and pesticides. Asbestos-containing materials. Treated timber, etc.	

Please indicate the link of the supply chain for which the solution can be applied? Describe how.

Identification of needs

.....

Conceptualization and planning

.....

Procurement – sourcing/ purchasing of products and services

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Goods collection in warehouses and repacking for transport to final destination
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Custom clearance
.....
Transport to the destination country (often multi-stage and using different modes of transport)
.....
Transport to the final destinations – last mile
.....
Storage at the final destination
.....
Operational logistic at final destination - distribution of goods and services
Potential reduction of plastic waste.

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