D4.1. Appendix No 3
Cluster of bio-based solutions
classified as “multi-purpose packaging products” (WP4, T4.2.1)

Disclaimer:

Scope: The appendix presents all the scoped solutions that were classified as “multi-purpose packaging products”. 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 given solution 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 3 includes presentation of the following 7 bio-based solutions:

1. Packaging utilizing Notpla Seaweed / Zero Waste Paper

Responsible partner: ITENE & PRO CIVIS
INVESTIGATION LINE: I and IV

Solution 1 on the final List	**Packaging utilizing Notpla Seaweed / Zero Waste Paper**
Product / service	**X**
Technology	**-**

I. Basic information

Description of functions

Notpla Seaweed Paper is remarkable zero-waste paper from a forest below the sea. The product is a new material that enables to challenge the status quo.

Seaweed provides lush biodiversity, regenerates faster, draws down more carbon and does not compete for soil. A by-product from seaweed processing, formerly considered waste, gives **Notpla Seaweed Paper** its unique veining quality while closing the loop on the seaweed industry.

Notpla Seaweed Paper's full potential allows for delivering boxes of different sizes and functions. Although the offering consists mostly of mailers, flyers, custom boxes, pouches – all of rather smaller dimensions (weights of 140 gsm, 280 gsm).

But there is also the 350 gsm weight – **the heaviest option for high-end applications**, which may be enough for deliveries of food, medical, sanitary and hygienic items. The Company upon the additional enquiry explains in this regard:

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"Our product is targeted at food applications so definitely yes for food. Regarding medical or sanitary products, we'd need to know more about the requirements for each use case. Our seaweed coating is designed to provide a grease and oil proof barrier which is not usually required for medical products, but it may solve another challenge you are facing."

"Our 350gsm Paper is made to create mostly secondary packaging like boxes or pouches."

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.

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?

The solution utilises a by-product from seaweed processing.

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

As a natural product, it is affected by humidity and temperature, and it might get curly if exposed frequently. But in terms of current use, it is sold in countries across Europe with varying climatic conditions and it performs as required in each country.
Regarding the use of the products in contexts such as Sub-Saharan and equatorial Africa especially, the Company has done a project in Ghana funded by NORAD where they trailed use of coated containers and Oohos in Accra. The video can be seen here:
https://www.linkedin.com/posts/plastic-punch_notpla-pilotproject-plasticwaste-activity-7231868046695419905-ypiL/.

The Company knows the product is performing well in this climate.
Moreover they are working on the 2nd phase for 2025 which will involve further assessing the performance of the coated containers in Accra.

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

Notpla Limited, 8B Queen's Yard, E9 5EN London, United Kingdom.

The representatives of PRO CIVIS met the experts from Notpla.

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

Yes it has. A Cradle to Grave LCA conducted by UCL in 2022 compared our product with conventional virgin pulp paper.

The Company is always working on updating and expanding the LCA so is also open to working on that through the project.

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Using seaweed by-products instead of virgin pulp, Notpla prevents 4 tonnes of trees from being cut down for every 1 tonne of seaweed by-product. Notpla Seaweed Paper has 88% lower Global warming potential (GWP) than conventional virgin pulp paper.

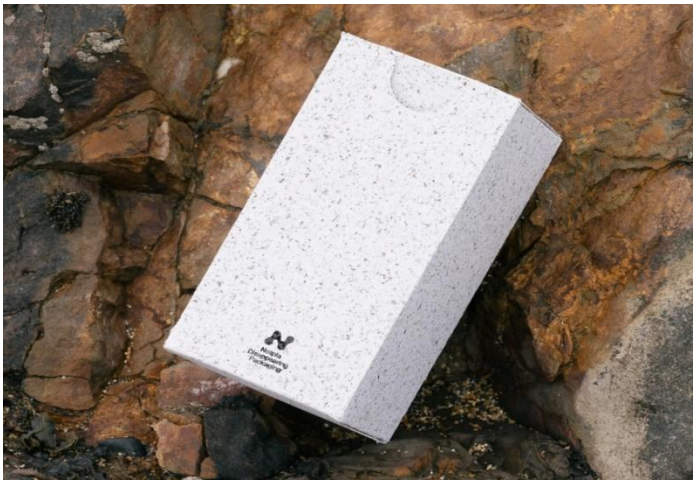
The LCA analysis available in pdf format.

Source of data

- The web page: https://www.notpla.com/paper
- Contact possible and executed over the web page forms.
- Additional contact with Zaid Moosa - Senior Grants and Partnerships Manager at Notpla.

References

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



Source: *the web page of Notpla*

The Company confirms the willingness to exercise social impact and is very interested in the use of their products within the humanitarian sector as it would be the perfect use case and example of how positive impact is a multiplier.

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.

Notpla Seaweed Paper is entirely natural and circular, is made to be recyclable and even home compostable while giving a second life to otherwise wasted biomass.

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;

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· *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.*

Notpla Seaweed Paper is sustainable and versatile.

The seaweed by-product the Company uses in the paper is an industrial by-product of Notpla's own extraction processes and those from the cosmetics and pharma industry which is otherwise a wasted resource. The Company has worked incredibly hard to make sure there are no synthetic additives or stabilisers (unlike in most normal papers) so it is as sustainable and pure as possible.

All the seaweed Notpla uses is sourced responsibly in Europe where the paper is made too.

The Product enables to make environmentally friendly packaging and print materials without compromising quality or performance.

The paper is also FSC certified and fully recyclable.

Aesthetically, it is totally unique, and it really holds its own in terms of design and quality.

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.	

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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)
Potential application.
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.

2. MYCO 4Pack and SafePads (material + technology)

Responsible partner: PRO CIVIS
INVESTIGATION LINE: IV

Solution 2 **on the final List**	**MYCO 4Pack and SafePads (material + technology)**
Product / service	**X**
Technology	**X**
I. Basic information	
Description of functions **MYCO 4Pack and SafePads** is a combination of protective mailers (made from natural materials) with cardboard as an effective and environmentally friendly option for product protection. **MYCO 4Pack packaging system** is based on paper capsules filled with **MYCO material (MYCO SafePads),** which absorb shocks. Combined with cardboard, they	

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create an effective and environmentally friendly option for protecting the products being transported.

The bio – based solution in this case is the **MYCO material** and **the MYCO technology** allowing for the efficient production of products from innovative 100% natural material. The developed technology enables industrial processing of the natural materials.

The MYCO material serves as the protective mailers in the cardboard and replaces the traditionally used plastic foams. The **MYCO material** is a composite material consisting of mycelium and waste from the woodworking or agricultural industry (sawdust, hemp shavings, paper, etc.). **The mycelium** is a dense network of fine filaments, called hyphae, that permeate the soil or other substrate where the fungus grows. The mycelium is the basic life system of the fungus, responsible for absorbing nutrients and water. The mycelium serves here as a natural binder that strengthens the otherwise loose raw material.

The Company's owner further explains:

- *the MYCO company is able to produce the bio – based **MYCO material** in less expensive way in comparison to other bio – based solutions and on the same level as plastics foams*
- *the **MYCO technology** is a simple patent of growing mushrooms on waste and it could be easily transferred also to African locations*

Description of technology and TRL level (if applicable)

TRL 9

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.

To be further explored re the technology.

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

The solution provides for the reduction of plastic waste connected to packaging purposes.

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

To be further explored regarding the technology.

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

myco s.r.o., Brno, the Czech Republic

Representatives of PIN and PRO CIVIS met the CEO of the Company, who is really interested in the MYCO product and technology to be further involved in the Bio4HUMAN project.

Additional technical and technological information available in the pdf format.

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

Some works have been executed, and the Company is willing to share the outcomes, as well as the further technological data necessary to conduct the Bio4HUMAN LCA.

The Company operates unique production technologies according to its own designs, which gives the advantage of more scalable production. This is mainly due to the continuous substrate preparation technology and rapid product forming technology.

The own developed continuous line for material sterilization is more efficient than conventional solutions. The forming process takes units of seconds, competitors need the product to be in shape for units of days. The Company have developed a unique single-purpose machine that speeds up the worker's work by 5 to 8 times.

How much carbon emissions are associated with the production of MYCO material products?

Material made of wood is usually considered one of the most environmentally friendly materials, because wood contains CO2 absorbed from the air. Moreover, the Company does not use primary raw materials, but waste that has no further use except for pelletization and incineration. The Company also takes great care to ensure that the raw materials are local and that the supply chains are as short as possible. Cradle to gate is 0.2 kg CO2 per 1 kg of material.

Source of data

- The winner of Rising Star Award 2024 (web page below in Polish)
  - https://mamstartup.pl/grzybnia-w-paczce-startup-myco-ma-nowe-rozwiazanie-chroniace-srodowisko-dla-branzy-opakowan-wywiad/
- The web page of the Company: https://www.myco.cz
- Contact over the mail: info@myco.cz
  - Additional contact directly with the CEO of the Company David Minařík

References

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

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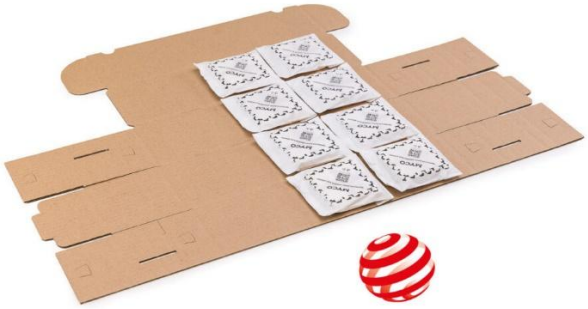
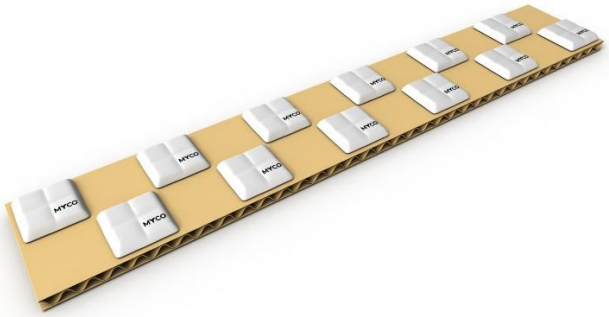


reddot winner 2024



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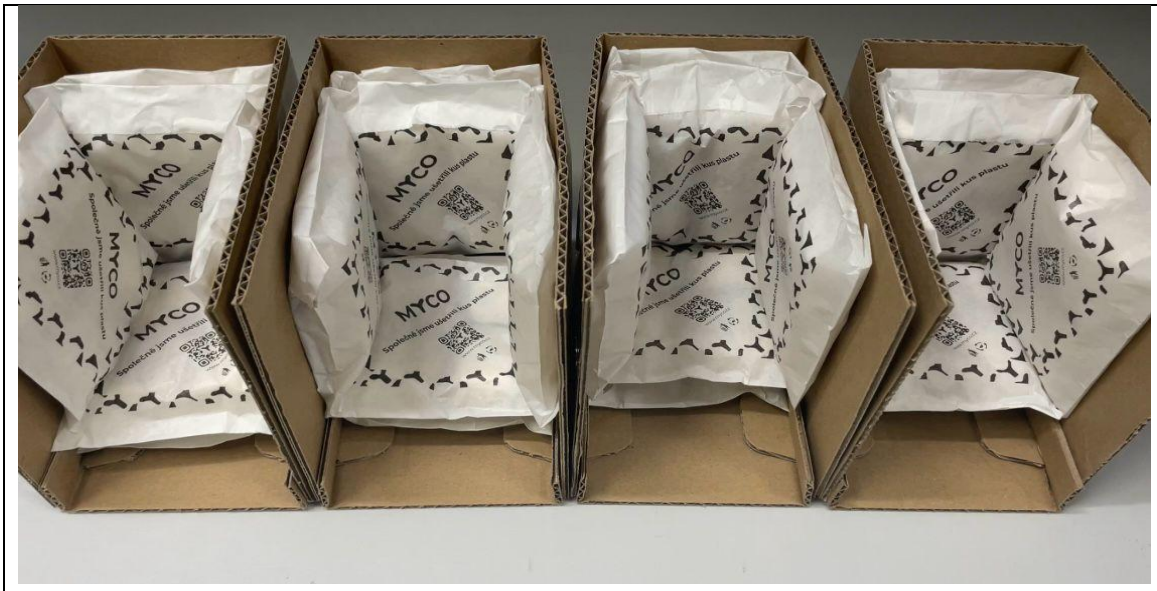

Source: *the web page of MYCO*

Examples of implementation:

- packaging for construction products
- packaging for refurbished electronics
- edge and corner protection for the packaged goods

The MYCO packaging system has already been used in transportation to African locations.

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 connected to packaging.

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 features of **the MYCO material**:

- 100% biodegradable
- from local waste raw materials

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- low energy production
- cradle-to-gate 0.2 kg CO2 per 1 kg material
- absorbent, executing ability to separate oil from the water

The Solution allows for the replacement of the plastic fillings of the packages with fillings made from mycelium.

The **MYCO** material could be produced at the destination location.

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
Potential application – packaging purposes.
Goods collection in warehouses and repacking for transport to final destination
Potential application – packaging purposes.
Custom clearance
.....
Transport to the destination country (often multi-stage and using different modes of transport)
Potential application – packaging purposes.

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

3. Sustainable film concept for medical and food

Responsible partner: ITENE
INVESTIGATION LINE: I

Solution 3 **on the final List**	PLA packaging solutions for food and diagnostic applications. **Sustainable film concepts for medical packaging**.
Product / service	Yes
Technology	-

I. Basic information

Description of functions
What is the effect or final product?
Südpack has PLA packaging solutions for food (Planova flow pack film) and diagnostic applications in its portfolio. We believe the medical application is the most interesting one (Südpack Medica) for B4H.

Description of technology and TRL level (if applicable)
NA

Description of product/service and TRL level (if applicable)
Product: TRL 9 (commercial product).
Tubular film made from the bio-based polymer polylactic acid (PLA) as an alternative to cellulose-based films or comparable films with high water vapor permeability

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
Confidential information.
What kind of waste the solution is able to utilize or valorise?
Industrially compostable. PLA is made from renewable resources.
To what extent does the use of a given solution or technology depend on climatic conditions?
Don´t know.
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
Südpack.

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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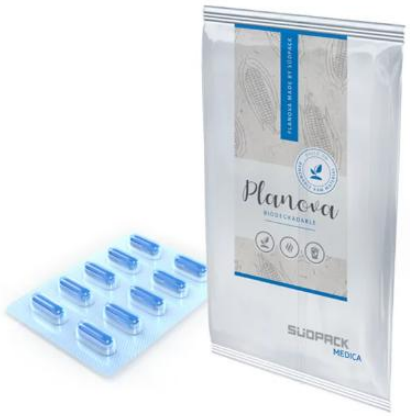

Source: *the web page of Südpack*

PLA tubular film for diagnostic applications. The optimized high-performance film represents an alternative to cellulose-based films such as cellophane or comparable films with high water vapor permeability. The material is based on renewable raw materials and can be composted industrially in accordance with DIN EN 13432. Designed in particular for demanding diagnostic flow pack applications for sterile barrier systems, the film features good mechanical properties as well as excellent oxygen and water vapor permeability. Gamma sterilization is possible without visual impairments. Its strengths lie in the use of renewable raw materials with a reduced CO_2 footprint – thus supporting current objectives for climate and environmental protection.

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D-88416 Ochsenhausen, Germany
Phone: +49 (0) 7352 925 – 1869
www.suedpack.com

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.
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 address the needs.
Use of renewable raw materials with a reduced CO_2 footprint – thus supporting current objectives for climate and environmental protection.

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*

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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.
To package medicines/diagnostic items at the source of production.

Identification of needs
Packaging of diagnostic kits/applications.
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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4. LAM'ON – Biodegradable laminating film

Responsible partner: PRO CIVIS
INVESTIGATION LINE: IV

Solution 4 **on the final List**	**LAM'ON – Biodegradable laminating film**
Product / service	**X**
Technology	**-**

I. Basic information

Description of functions

LAM'ON is a 100% biodegradable laminating film for print and packaging. It is derived from renewable resources like corn. The glue layer that was developed specifically for the needs of the industry is completely toxic-free. It is also water soluble and that will ease the recycling process.

Main characteristics of LAM'ON:

- crafted from bio-based materials (85 %)
- compostable (100 %)
- 90 cm width, 50 µm max thickness
- applied on standard laminators
- printable
- water resistant to keep the products safe without compromising on sustainability

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 waste connected to packaging purposes.

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

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LAM'ON OOD, Orlandovtsi, Grncharska 3, 1202 Sofia, Bulgaria

The Company is very eager to enter Bio4HUMAN pool of bio – based solutions.

The contact over the mail address contact@lam-on.com with Angela Ivanova, the inventor and owner of the Company.

Has the Life Cycle Analysis been already done for this solution?
In the process of finding out.

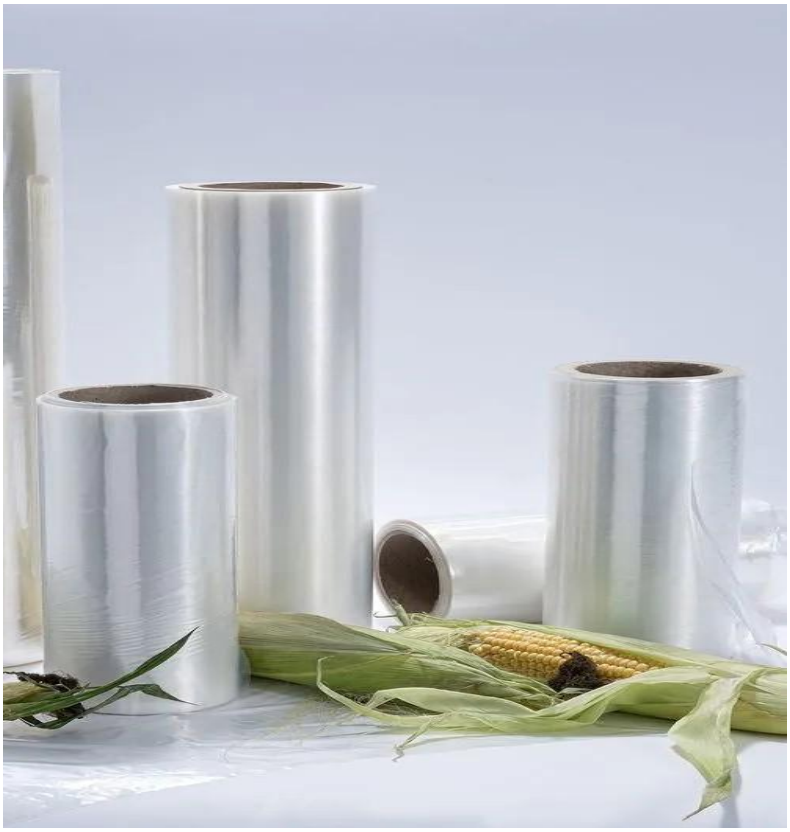
The production method is simplified in a way that saves time and money.

LAM'ON offers the same results, is used on the same machines, and is offered at the same price range as the currently used laminating films.

Source of data

- The shortlist of finalists for the "Bio-based Material of the Year 2020" of the 13th International Conference of Bio-based Materials, May 2020:
  - https://www.bioplasticsmagazine.com/en/news/meldungen/20200402Shortlist-of-finalists-Bio-based-Material-of-the-Year-2020-announced.php
- The web page of the Company: https://www.lam-on.com

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



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Source: *the web page of LAM'ON*

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 waste connected to packaging.

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.

LAM'ON is the conscious choice for bio-based and compostable thermal laminating films for paper and cardboard application and packaging foils for garments, cosmetics and food.

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.	

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

5. monta biopack® – self-adhesive tape (monta Klebebandwerk)

Responsible partner: PRO CIVIS
INVESTIGATION LINE: IV

Solution 5 **on the final List**	**monta biopack® – self-adhesive tape (monta Klebebandwerk)**
Product / service	**X**
Technology	**-**
I. Basic information	
Description of functions	

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monta biopack® is the certified sustainable self-adhesive tape. It is made from about 90 % renewable resources; its carrier is a bio-based PLA film that is coated with a natural rubber adhesive.

Under industrial composting conditions, this packaging tape biodegrades within a few months.

Properties of **monta biopack®:**

- Proven sustainability: Certified conformity with „OK COMPOST INDUSTRIAL“ scheme by
  TÜV Austria: Meets EN 13432 (09-2000), ASTM D6400-23, AS 4736-2006 and ISO
  17088:2021
- Strong and robust backing material
- Excellent immediate tack and adhesion on various surfaces
- Low elongation
- Hand tearable
- Temperature resistant: from -30°C to +70°C short term (after application at room
  temperature)
- Easy to unwind
- Vegan

The applicability of **monta biopack®**:

- sealing biodegradable bags and films and other sustainable packaging types
- permanent closure of medium heavy to heavy cardboard boxes
- suitable for manual application in various hand- and table dispensers as well as in
  automated packaging machines
- bundling garden waste

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 waste connected to packaging purposes.

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

Temperature resistant: from -30°C to +70°C short term (after application at room temperature).

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

monta Klebebandwerk GmbH, Gottesackerstr. 17, 87509 Immenstadt, Deutschland

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

In the process of finding out.

Source of data

- The shortlist of finalists for the "Bio-based Material of the Year 2020" of the 13th International Conference of Bio-based Materials, May 2020:
  - https://www.bioplasticsmagazine.com/en/news/meldungen/20200402Shortlist-of-finalists-Bio-based-Material-of-the-Year-2020-announced.php
- The web page of the Company: https://monta.de
- The mail correspondence over the mail addresses:
  - marketing@monta.de ; sales@monta.de ; info@monta.de ;

References

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

TECHNICAL DATA	METRIC		IMPERIAL	
Backing	PLA			
Adhesive	Natural Rubber			
Colour	transparent			
Tensile force	N/25mm N/cm	min. 80 min. 32.2	lb/in	min. 18.4
Backing thickness	µ	30	mil	1.2
Adhesive strength on steel	cN/25mm N/cm	500 2	oz/in	18.4
Core Diameter	mm	76	in	3

OK compost

TÜV AUSTRIA INDUSTRIAL S0860

Source: *the web page of "monta Klebebandwerk"*

Low noise	*	Resistant to humidity	*
Tensile strength (breaking load)	**	Residue-free removal from various substrates	-
Immediate tack	**	UV and aging resistant	*

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Adhesion (to steel)	***	Die cutting	*
For smooth surfaces	***	Manual Rolls	***
For different surfaces	***	Machine Rolls	***
For challenging surfaces	***	OK COMPOST INDUSTRIAL certified	*
for delicate surfaces	-	Greenline	*
Easy and smooth unwinding	***	Carton sealing (carton weight)	***
Printable (*** directly / * with primer release)	-	Suitable for food contact	-
Low temperature	*	Product with financial climate contribution	*
High temperature	*		

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 waste connected to packaging.

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.

monta biopack® meets the requirements on disintegration (composting), biodegradation, ecotoxicity and material characteristics of EN 13432, ASTM D 6400-04, AS 4736 (2006) and ISO 17088 (2012).

Certified by TÜV Austria and awarded with the “OK COMPOST INDUSTRIAL” conformity mark, **monta biopack®** is the eco-friendly choice for sealing cardboard boxes, biodegradable bags and for bundling garden waste.

Its sustainable roll length of 80 m and 1,200 m reduces unnecessary packaging waste.

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
.....
Conceptualization and planning
.....
Procurement – sourcing/ purchasing of products and services
Potential application – packaging purposes.
Goods collection in warehouses and repacking for transport to final destination
Potential application – packaging purposes.
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 – packaging purposes.

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6. Sway Polybags

Responsible partner: PRO CIVIS
INVESTIGATION LINE: IV

Solution 6 **on the final List**	**Sway Polybags**
Product / service	**X**
Technology	**-**

I. Basic information

Description of functions

Sway Polybags are being made with seaweed, plants, and compostable polymers. The bag is strong and versatile, designed to protect items in transit. While this bag performs like plastic, it lasts only as long as it's needed, returning to nature through home or industrial composting.

With seaweed as its hero ingredient, every **Sway Polybag** helps divert petroleum and support healthy ecosystems and communities. Seaweed is an abundant, fast-growing crop that can improve ocean health while providing climate-resilient employment in coastal regions. The seaweed is sourced from a global network of vetted ocean farms and processors who cultivate seaweed responsibly.

Sway Polybag demonstrates how seaweed-based materials can meet the demands of global supply chains while delivering on performance, sustainability, and circularity.

The basic characteristics of the Sway Polybag:

- thickness: 3mil
- opacity: 7-8%, transluscent
- texture: flexible, smooth
- durability: high
- tear strength: medium
- oxygen barrier: medium
- heat sealable
- printable

The main ingredient of Sway Polybag is actually the TPSea™ - patented golden pellet, which can go anywhere plastic goes, with a few big differences. TPSea™ comes from the ocean, and is designed to return to the soil. TPSea™ is:

✓ Melt Processable
✓ 100% Biobased
✓ Majority Seaweed
✓ Home Compostable

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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.

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. The product is strong and versatile, it can withstand a wide array of temperatures and exposure to moisture.

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

Sway , an early-stage entrepreneur , with the seat in San Francisco.

Sway is one of the nine winners of the Beyond the Bag Challenge 2021 launched by the largest and most influential names in retail – Walmart, CVS Health, and Target. The Beyond the Bag Challenge competition was a global contest organized by Closed Loop Partners to reimagine the ubiquitous plastic bag. The competition received more than 450 submissions from sixty countries and **Sway** was one of the nine winners.

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

In the process of finding out.

Source of data

- The webpage of the Plant Based Products Council: https://pbpc.com/plant-based-leaders-sway/
- The webpage of the Company: https://swaythefuture.com/
- The contact over the mail addresses:
  - team@swaythefuture.com ;
  - press@swaythefuture.com ;

References

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

The applicability of the Sway Polybag:

- protection in shipping transit
- dust guard
- personal care
- home goods, fashion, accessories

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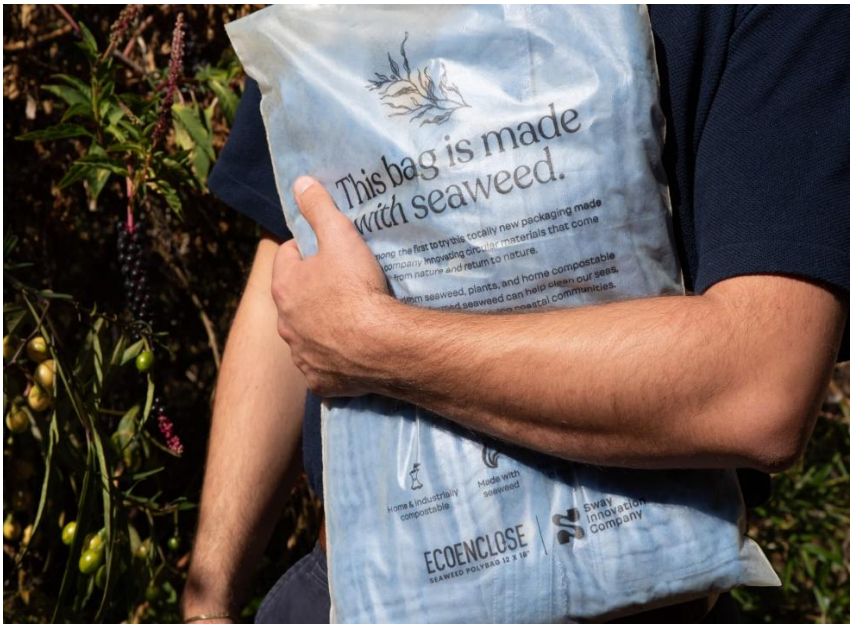

Source: *the web page of Sway*

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.

Home compostable (TUV pending)
Industrially compostable (TUV pending)

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.*

Many polybags can and should be eliminated but have become a staple in supply chains worldwide due to their ability to protect products from dust and damage

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during shipping, ensuring orders arrive to retailers and individuals in pristine condition.

Sway Polybag aim to maintain these necessary performance qualities, while generating benefits for climate, ocean health, and coastal communities.

Sway Polybags are compostable - through home compost, green bin, or any other compost method available. The bags return to the soil as healthy nutrients, which means no microplastics.

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
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)

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Potential application.
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.

7. Wood Foams utilising the Fibrease® and Papira®

Responsible partners: IBF & PRO CIVIS
INVESTIGATION LINES: III and IV

Solution 7 **on the final List**	**Wood Foams utilising the Fibrease® and Papira®**
Product / service	**X**
Technology	**-**

I. Basic information

Description of functions

Wood Foams is the sustainable game changer in protective packaging. The **Wood Foams** are forest forward innovations sourced from sustainably managed forests. The solution is leveraging the renewable potential of trees and helping in phasing out fossil-based materials. **Wood Foams** by **Stora Enso** is a revolutionising way to keep the products safe and the packaging sustainable.

Wood Foam innovations are easy to fabricate and offering both flexible and rigid options. With high cushioning effect and efficient insulation properties, **Wood Foams** can be a direct substitute to traditional fossil-based materials.

Wood Foams are using two types of materials:

1) **Fibrease®** which is a composite material, suitable for insulation purposes in medical shipments, life science, meal kit deliveries, or as protective and void fill when transporting light and fragile goods. All while replacing plastic materials with a bio-based alternative.

   The flexible and resilient material has a soft memory foam like behavior similar to PU-foam, fitting various types of conversion methods like sawing, die-cutting, waterjet cutting and laminating. **Fibrease®** is recyclable in paper and board streams in certain geographies. The aim of Stora Enso is to prove recyclability across all geographies. The demo material shows great promise in this regard.

Funded by the European Union

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The solution can also serve as a sound and construction insulation.

2) **Papira®** which is the breakthrough innovation designed to reduce plastics and waste in future packaging solutions. This bio-based and recyclable alternative to fossil-based materials proves that wood fibres can phase out expanded polystyrene (EPS) and polyethylene (PE) foams.

   Responsibly sourced, biodegradable in home compost, and sustainable through the entire lifecycle, **Papira®** is made of wood fibre from sustainably managed Nordic forests. Rigid, and with excellent shock absorbing properties, it is suitable for a wide variety of application needs from industrial, electronic and medical equipment – to fragile goods. **Papira®** is fully recyclable with paper and board materials, allowing it to be part of a circular material flow in existing packaging waste management systems all over the world.

   The solution can also serve as a sound and construction insulation.

Description of technology and TRL level (if applicable)

-

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

Fibrease® is under development for commercial scale and being tested by partners.

Papira® - the material from the pilot plant shows promise for future packaging.

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

Stora Enso, Stockholm, Helsinki

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

In the process of finding out.

Papira® - the material from the pilot plant shows promise for future packaging with lower carbon footprint, less waste and great protective properties.

Source of data

1) The web page: https://www.storaenso.com/en
2) Contacts over the Innovation Department of Stora Enso.

References

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

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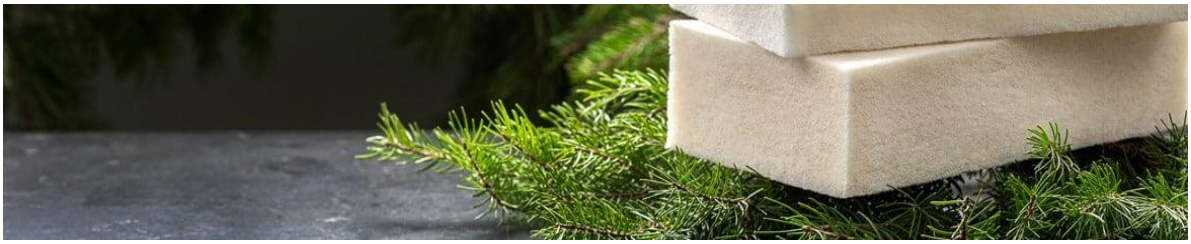

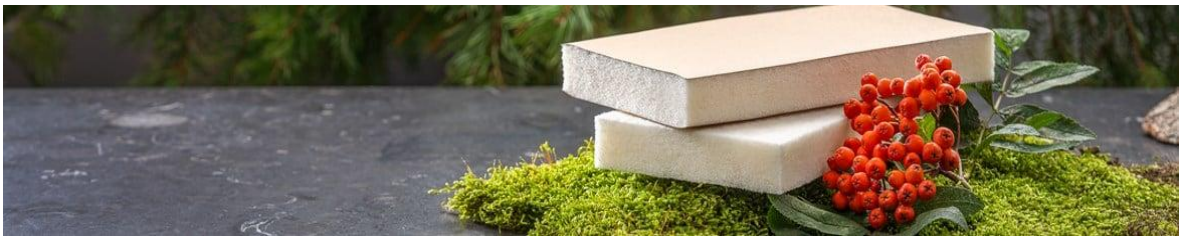

Source: *the web page of Stora Enso*

The solutions have already been applied *inter alia* for the purposes of packaging electronic equipment and furniture.

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 packaging waste.

Possibilities for recycle.

Papira®

- the biodegradation and disintegration of Papira under screening home composting conditions has been tested by Normec OWS;
- recyclable according to CEPI recyclability laboratory test method Version 2, score result 100/100.

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.

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

Fibrease® is the future of thermal insulation and lightweight cushioning, reducing plastics and waste.
Key benefits:

- significantly reduced CO2-emissions when replacing polymer foams
- bio-based, made from sustainably sourced and traceable wood fibers
- recyclable in paper/board stream
- soft and flexible foam

Papira® looks like an excited future material for packaging with lower carbon footprint, less waste and great protective properties.
Key benefits:

- bio-based, plastic-free and biodegradable material made from sustainably sourced and traceable wood fibers
- recyclable with paper and board materials
- excellent cushioning performance, lightweight and endless design possibilities

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

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