D4.1. Appendix No 6
Cluster of bio-based solutions
classified as “construction related products” (WP4, T4.2.1)

Disclaimer:

Scope: The appendix presents all the scoped solutions that were classified as “construction related 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 6 includes presentation of the following 4 bio-based solutions:

1) KINGSPAN Bio based insulation in buildings

Responsible partner: IBF
INVESTIGATION LINE: III

Solution 1 **on the final List**	**KINGSPAN Bio based insulation in buildings**
Product / service	*X*
Technology	*Please mark X if relevant*

I. Basic information

Description of functions
What is the effect or final product?
It has been developed to help reduce the carbon footprint of buildings. The product range, largely made from hemp, a fast-growing bio-based material.

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

Description of product/service and TRL level (if applicable)
Kingspan's new HemKor product range, launched by Kingspan's Insulation business, has been developed to help reduce the carbon footprint of buildings. The product range, largely made from hemp, a fast-growing bio-based material, has three products: Jute Blend, Pure and Padding. The HemKor Jute Blend product, with a bio-based content of at least 80%, combines hemp with recycled jute bags and has a thermal performance of 0.040 W/mK. The HemKor Pure product, with a bio-based content of over 95%, has a thermal performance of 0.043 W/mK. Both products have been tested according to the NCS 16785 standard for bio-based products.

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)

This will be used in construction of buildings. Hemp is a circulation crop and grows from seed to maturity in just 4 to 5 months. Due to its rapid growth,

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height (up to 5 metres) and deep roots (up to 3 metres), hemp is a good crop for storing carbon.

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

KINGSPAN, contacted and would be happy to provide more information.

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

Source of data

https://www.kingspangroup.com/en/news-insights/hemkor-our-first-bio-based-product/,

References

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

This will be used in construction of buildings. Hemp is a circulation crop and grows from seed to maturity in just 4 to 5 months. Due to its rapid growth, height (up to 5 metres) and deep roots (up to 3 metres), hemp is a good crop for storing carbon.

Source: *the web page of KINGSPAN*

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 CO2, in the part of the hemp plant that is used, is stored in the building in which the product is installed. This is only released if the product is not reused or recycled at the end of its lifespan.

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.

It could be adaptable to local conditions utilising local hemp resources but would probably need to be transferred to a specialised factory.

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

Hemp could be sourced locally so difficult to transport biomass abroad to be refined.

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)

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May require shipping transport
Transport to the final destinations – last mile
Can be transported by road
Storage at the final destination
No particular specifications
Operational logistic at final destination - distribution of goods and services
Yes

2) Product lines made from bioPUR

Responsible partner: ITENE
INVESTIGATION LINE: I

Solution 2 **on the final List**	**Product lines made from bioPUR.**
Product / service	X
Technology	X

I. Basic information

Description of functions
What is the effect or final product?
Their mission is to reduce both direct and indirect CO_2 emissions in buildings and homes by addressing key weaknesses in thermal insulation. They achieve this through two innovative product lines made from bioPUR, which feature 65-75% renewable content:
-KLIMA-PUR Windows: High-performance, energy-saving windows with frames made from bioPUR, offering excellent thermal and acoustic insulation. These windows also enhance recyclability at the end of their life cycle.
-bioPUR Foams: A diverse range of bioPUR insulation foams for roofs, walls, and floors that deliver outstanding thermal performance with increased sustainability compared to traditional insulation materials.

Description of technology and TRL level (if applicable)
NA

Description of product/service and TRL level (if applicable)
Product: TRL 7-8 (prototype demonstration).
Service: 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.
Investment size per development 100-250k€
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
INDRESMAT.

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.

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Source: *the web page of INDRESMAT*

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.
Recycle materials (for a service or technology 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.
PUR may be obtained from renewable raw materials (resource efficiency), while being a fully recyclable material (circularity). These materials have a low carbon footprint (bio-based and recycled content) and reduce energy consumption in houses and buildings.

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
.....
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
.....

3) Eco-friendly insulation with natural sheep's wool

Responsible partner: PRO CIVIS
INVESTIGATION LINE: IV

Solution 3 **on the final List**	**Eco-friendly insulation with natural sheep's wool**
Product / service	**X** Please note that for the purpose of the Bio4HUMAN project, the bio – based products have been during the T.4.1. works predefined as *"products that are wholly or partly derived from materials of biological origin, e.g. plants, algae, marine organisms, forestry, microorganisms, animals and biological waste from households, agriculture, animals and food/feed production."*
Technology	-
I. Basic information	
Description of functions	
Building materials have an important role to play in reducing the carbon footprint. So, it is no surprise that more renewable materials like **sheep's wool** are showing up. **Sheep's wool** is a promising alternative to the other traditional solutions on the market. **Wool's natural structure** makes it incredibly effective as an insulator. Each wool fiber is composed of protein molecules (keratin) organized into five follicles. These fibers effectively trap air, moisture and harmful chemicals. Using wool as	

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insulation actually helps keeps the facility warm in the winter and cool in the summer, while improving indoor air quality.

Wool-based insulation can be easily customised to fit specific dimensions and used in the same way as other types of insulation. Compared to other types of insulation, **sheep's wool** has a strong reputation for being fully eco-friendly and comes close to meeting the benchmark set by other types of man-made insulation.

The sheep wool insulating material proposed by **Eco Friend Sheep** is the right solution for improving energy efficiency and keeping homes and other facilities comfortable no matter the season. Made with 100% natural sheep wool, the insulation solution is sustainably sourced and renewable in order to make the contribution for a greener planet.

The Eco Friend Sheep solution could be applied for insulating roofs, ceilings, walls, floors, doors, windows.

The main features of the proposed product:

- retains its high insulation performance, even when its wet
- controls moisture by absorbing and releasing it from ambient air
- stabilizes heat changes
- prevents mold and mildew growth
- minimizes condensation
- functions as an air filter trapping nitrogen oxides, sulphur dioxide and formaldehyde
- is fire resistant
- maintains minimum 90 % noise reduction coefficient

Eco Friend Sheep wool insulation meets the requirements and standards applied to residential, commercial and industrial environments.

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.

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

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S.C. ECO FRIENDSHEEP S.R.L.
Calea Alexandriei 5, Costești, Jud. Argeș, Romania

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

Eco Friend Sheep wool insulation products hold the ISO certifications for sustainable building materials which stand for health compatibility, environmentally friendly production and conservation of finite resources.

Source of data

1) The list of solutions / technologies identified and / or employed by the Bio4AFRICA project: https://www.bio4africa.eu/technologies/technology-catalogue/
2) The web page: https://ecofriendsheep.eu/
3) Contact over the mail address: office@ecofriendsheep.eu

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

Source: *the web page of ECO FRIENDSHEEP*

The product portfolio includes four types of insulating sheep wool, suitable for each needed application.

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 construction / building waste.

The proposed solution could be reused and has the features of biodegradability.

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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.*

The sheep wool insulating material proposed by **Eco Friend Sheep** is:

- 100 % natural – made with 100 % natural sheep wool;
- renewable – another layer grows after each shearing;
- sustainable – its production does not affect the environment and does not pollute;
- totally recyclable – it can be reused and if this is not desired, the danger to the environment is minimal, being biodegradable.

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.	

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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
Potential application.

4) Coextruded hemp composite board

Responsible partner: ITENE
INVESTIGATION LINE: V

Solution 4 **not on the final List**	**COEXTRUDED HEMP COMPOSITE BOARD**
Product / service	**X**
Technology	
I. Basic information	
Description of functions *What is the effect or final product?* A co-extruded hemp composite board (CHB) made from a combination of hemp fiber, hemp hurd, and binder material configured to be used as an environmentally friendly alternative to traditional construction materials.	
Description of technology and TRL level (if applicable) Not applicable	
Description of product/service and TRL level (if applicable) A co-extruded hemp composite board (CHB) made from a combination of hemp fiber, hemp hurd, and binder material from sustainable sourced feedstocks and	

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industrial/residential waste that is mixed and extruded to create construction materials of different grades, depending on the application in which the finished CHB is to be used. It may be configured to match or exceed the strength of conventional construction materials, including oriented strand board (OSB), plywood, gypsum board, subflooring, flooring, etc. It also may be configured to be weather resistant, pest resistant, rot resistant, fire resistant, insulative, etc. to increase the service life when compared to that of traditional construction materials.
No TRL information provided, but it is considered a TRL 7-8 (prototype demonstration).

Basic conditions of use

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

The product can be obtained in conventional extrusion and molding lines.

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

No information disclosed.

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

Industrial/residential waste from construction and manufacturing processes (wood fines, bio-carbon, gypsum, glass, post- consumer/industrial plastics, or any combination thereof) and hemp feedstocks

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

Climatic conditions may affect to the amount of hemp waste generated from crops and this will affect to the final composition of the composite board.

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

This solution requires power and water-supply equipment to produce the composite boards. It could work as an autonomous unit, but it could be complex to be mobile as it requires power and water.

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

GRAHAM John D.,US | BRADLEY John J.,US. No contact information was found.

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

No information available

Source of data

Derwent Innovation patent search

References

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

A top view of a finished CHB product embodying features consistent with the principles of the present disclosure.

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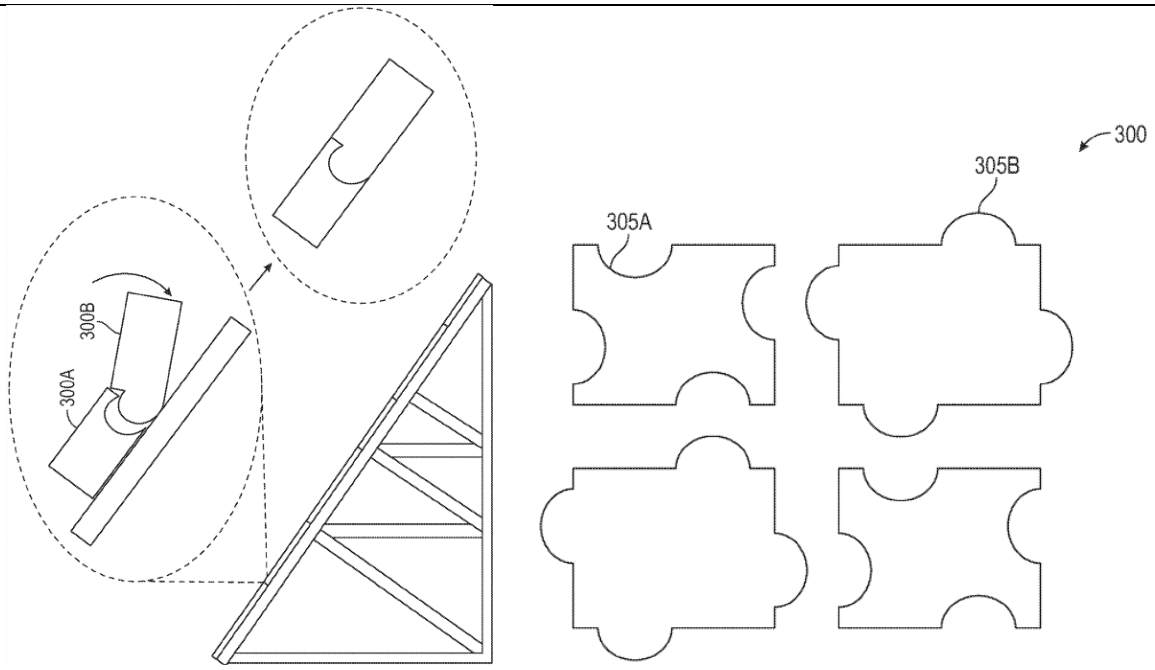
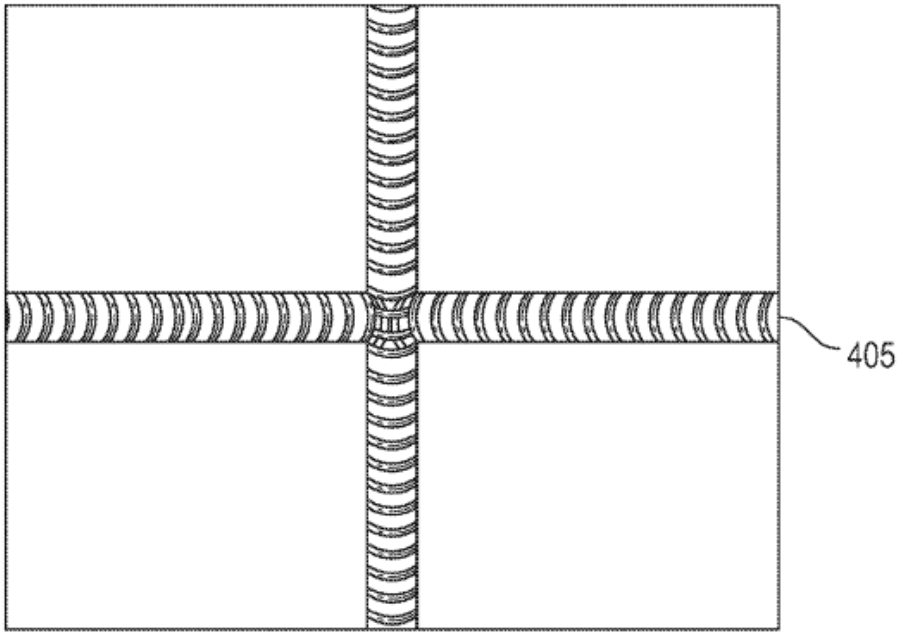


A bottom view of a finished CHB product.



Source: *the Derwent Innovation patent search*

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.

The solution refers to 4R principle as it involves a reduction of raw materials, a reuse and recycle of construction boards and recover as it transforms waste into new resources.

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 solution is related to the utilization of local resources as it requires waste materials from hemp feedstocks and industrial/residential waste from construction and manufacturing processes.

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.

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Please indicate the link of the supply chain for which the solution can be applied? Describe how. This solution belongs to the building and construction sector, and it addresses the procurement-sourcing of products and services.
Identification of needs
.....
Conceptualization and planning
.....
Procurement – sourcing/ purchasing of products and services
Sourcing of residential/industrial waste and raw materials/additives to produce the composite boards.
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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