



## *Request for Information – Appendix*

### **Design and prototyping of alternatives to Polypropylene bags - APPENDIX**

#### **APPENDIX 1: PRESENTATION OF THE CLIENT, PARTNERS, AND PROJECT MANAGER**

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The Client is the ICRC, on behalf of three international organizations, so called Partners, that are described below.

##### **International Committee of the Red Cross**

The work of the ICRC is based on the Geneva Conventions of 1949, their Additional Protocols, its Statutes – and those of the International Red Cross and Red Crescent Movement – and the resolutions of the International Conferences of the Red Cross and Red Crescent. The ICRC is an independent, neutral organization ensuring humanitarian protection and assistance for victims of armed conflict and other situations of violence. It acts in response to emergencies and at the same time promotes respect for international humanitarian law and its implementation in national law.

*For further information, visit the [ICRC website](#)*

##### **United Nations High Commissioner for Refugees**

UNHCR, the UN Refugee Agency, is a global organization dedicated to saving lives, protecting rights, and building a better future for refugees, forcibly displaced communities and stateless people. UNHCR works to ensure that everybody has the right to seek asylum and find safe refuge, having fled violence, persecution, war, or disaster at home. Since 1950, UNHCR has faced multiple crises on multiple continents, and provided vital assistance to refugees, asylum-seekers, internally displaced and stateless people, many of whom have nobody left to turn to.

*For further information, visit the [UNHCR website](#): [UNHCR](#)*

##### **World Food Programme**

The World Food Programme (WFP) is the leading humanitarian organization saving lives and changing lives, delivering food assistance in emergencies, and working with communities to improve nutrition and build resilience.

In 2019, WFP assisted 97 million people – the largest number since 2012 – in 88 countries.

On any given day, WFP has 5,600 trucks, 30 ships and nearly 100 planes on the move, delivering food and other assistance to those in most need. Every year, we distribute more than 15 billion rations at an estimated average cost per ration of US\$ 0.61. These numbers lie at the roots of WFP's unparalleled reputation as an emergency responder, one that gets the job done quickly at scale in the most difficult environments.

WFP's efforts focus on emergency assistance, relief and rehabilitation, development aid and special operations. Two-thirds of our work is in conflict-affected countries where people are three times more likely to be undernourished than those living in countries without conflict.

*For further information, visit the [WFP website](#)*

##### **The Project Manager**

###### **Sofies SA**

Sofies is an international sustainability project management and consulting firm. Created in 2008 because of the combination of the experience, technical skills, and networks of its founding partners, SOFIES provides innovative solutions to improve the environmental, social, and economic performance



of its customers' activities. SOFIES comes with the experience of over 40 highly qualified consultants, who have been active in various fields of technical cooperation in Europa, South and Central America, Africa and Asia, with more than 500 projects delivered in more than 40 countries around the world. As of October 2021, Sofies is a part of the DuPont Sustainable Solutions family

For further information, visit the [Sofies website](#)

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## APPENDIX 2: REQUIREMENTS ON THE BIDDER

### Scope of the project, consortium

The Bidder can choose to answer to one or several lots.

The Bidder has the right to sub-contract a part of the work (maximum 25%), under its responsibility.

### Intellectual Property

The Partners are aiming at a positive impact beyond their respective organizations. The solutions developed in the context of this project shall be free of any property's rights to enable a worldwide dissemination. The material formulation and the manufacturing process shall not be kept secret.

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## APPENDIX 3: TEMPLATE FOR THE RFI

The Proposal submitted in response to the RFI should be **no more than 3 pages** in length (excluding annexures). The following content should be included in the proposal:

Section	Content
About the organization	<p>Brief description of the bidder's organization. This section should at a minimum contain the following information:</p> <ul style="list-style-type: none"> <li>• Official registered name, mailing address, main telephone number and web address</li> <li>• Organizational description</li> <li>• Brief paragraph on how the bidder's profile is suited to the project and motivation to deliver it</li> </ul>
Solution presentation	<ul style="list-style-type: none"> <li>• An introduction to the solution proposed by the Bidder, along with information regarding current application of the solution, its maturity, and suitability to the project needs</li> <li>• Up to 3 brief project references demonstrating the experience of the bidder in delivering similar projects previously</li> </ul>
Comments on the RFI	<ul style="list-style-type: none"> <li>• Any suggestions/recommendations the bidder may have on the RFI such as alternative solutions (outside of the 5 lots), key doubts/gaps in information, concerns/caveats (if any)</li> </ul>

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## APPENDIX 4: BAGS SPECIFICATIONS

### Technical parameters



- **Mandatory**

- a) Food grade **and** non-food grade options.
- b) Drop test: The bags of finished product must pass the drop test (after each drop, there shall be no rupture or loss of contents) following the principles of the drop test standard (EN 277, ISO 7965-2 or equivalent) with following sequence:
  - Butt dropping: Bag is dropped from a height of 1.20m on the bottom and the top of the bag.
  - Flat dropping: Bag is dropped from a height of 1.60m twice on one flat face and twice on the opposite flat face.

Note: non-essential for NFI

- c) Size range: from 5kg to 90kg (25kg and 50kg being the vast majority).
  - d) Durability (=life span) 24 months under typical warehouse conditions (up to 50°C/ 90%RH). Limit to be defined based on comparison with current PP woven bags (e.g, as per ASTM D4329).
  - e) Minimum breaking force (to prevent bags to tear) – horizontal and transversal: 600N.
- **Nice to have**
    - f) UV stabilizers: The fabric shall retain 50 percent of its original minimum tensile strength in each direction after 300 hours of exposure (Test specimens are alternately exposed to UV light alone (200h in total) and to condensation alone (100h in total) in a repetitive cycle) when tested in accordance with ISO 21898 in a QUV accelerated weathering tester.
    - g) Reduce pest infestation of food (criteria: no fumigation needed over time): medium barrier performance for food requiring some protection (WVTR< 5 g/m<sup>2</sup>/day (38°C/90%RH) and OTR< 1500 cc/m<sup>2</sup>/day (23°C / 0% RH)).

### **Business requirements**

- h) Cost: the cost, based on large scale production, of the alternative solution should not be very much exceeding the cost of the current PP bag.

As a benchmark: cost of bagged 50 kg PP woven bags: approx. USD 6-7 per metric ton of food when loading from India. Bags are normally produced locally (approx.: 0.38 USD for 50kg bags).

### **APPENDIX 5: CRITERIA AND PRIORITIES FOR THE DEVELOPMENT OF AN ALTERNATIVE TO PP WOVEN BAGS**

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A panorama of alternative solutions to package humanitarian food and non-food items has been established and solutions have been prioritized, based on a multicriteria evaluation, and considering the Partners constraints and targets.

The focus has been given on:

- Comply with the functional specifications of the current PP woven bag (food and non-food items)
- Minimize plastic leakages as well as water and CO<sub>2</sub> footprints
- Keep a high reuse rate of the material (even if very difficult to estimate)
- Favor high maturity and high production capacity to enable an industrial deployment of the solutions within less than 3 years



To focus the investigations and prioritize the solutions, a multicriteria assessment has been developed.

Every solution is assessed based on four main categories characterized by several criteria. The weighting system is described in the [Table 1](#).

*Table 1: Scoring system of the multicriteria analysis*

Category	Criteria	Weight of the category	Weight of the criteria in its category (1: low to 3: high)	Overall weight of the criteria
Technology	Adequation with mechanical and physical specifications	25%	3	6%
Technology	Food-contact	25%	3	6%
Environment	Leakages	25%	3	8%
Environment	CO2 impact of production	25%	3	8%
Environment	Water impact	25%	3	8%
Society	Reuse	25%	3	25%
Environment	Recyclability	25%	1	3%
Technology	Production capacity	25%	3	6%
Technology	Time to market	25%	3	6%
Economy	Price	25%	2	25%

The materials have been assessed based on current Sofies SA and Partners knowledge, on literature and ad-hoc contacts with experts. The assessment is described in the [Table 3](#).

The score given per criteria is as follows:

*Table 2: Description of score level per criteria*

Score	Description of the performance of the material compared to the current PP woven bag
0	Equivalent
1	Slightly better
2	Significantly better
3	Outstanding
-1	Slightly lower
-2	Significantly lower
-3	Very low

It is a general assessment, and the scores may vary according to the specific solution proposed by the Bidder.



Table 3: Multicriteria assessment of different materials that could be used as an alternative to virgin PP

Alternatives	Adequation with mechanical and physical specifications	Criteria																	Additional Criteria					Score Food-Contact	Score Non Food-Contact				
		W	Food-contact	W	Leakages	W	CO2 impact of production	W	Water impact	W	Reuse	W	Recyclability	W	Production capacity	W	Time to market	W	Price	W	Tech (non food)	Env	Societal			Economic			
Virgin woven PP	0	3	0	3	0	3	0	3	0	3	0	3	0	3	0	3	0	3	0	3	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>INCREMENTAL SOLUTIONS</b>																													
Long-lasting woven PP	3	3	0	3	1	3	-1	3	0	3	3	3	-1	1	0	3	0	3	-1	3	-1	2	0.50	0.67	-0.10	2.00	-1.00	-0.35	0.39
Recycled food-contact woven PP	-1	3	-1	3	0	3	1	3	2	3	0	3	0	1	-3	3	-2	3	-1	2	-1.75	-2.00	0.90	0.00	-1.00	-0.46	Not applicable	Not applicable	
Recycled non food-contact woven PP	-1	3	-1	0	0	3	1	3	2	3	0	3	0	1	0	3	0	3	0	2	-0.33	-0.33	0.90	0.00	0.00	Not applicable	Not applicable	0.14	
<b>SOLUTIONS WITH ALTERNATIVE MATERIAL</b>																													
Paper based	-2	3	-1	3	3	3	3	3	-2	3	-2	3	0	1	-1	3	-1	3	-1	2	-1.25	-1.33	0.90	-2.00	-1.00	-0.84	-0.86		
Paper based with liner	-2	3	0	3	2	3	1	3	-2	3	-2	3	-2	1	0	3	-1	3	0	2	-0.75	-1.00	0.10	-2.00	0.00	-0.66	-0.73		
Recycled paper based	-2	3	-2	3	3	3	1	3	0	3	-2	3	0	1	-1	3	-1	3	-1	2	-1.50	-1.33	1.80	-2.00	-1.00	-0.68	-0.63		
Recycled paper based with liner	-2	3	-1	3	2	3	2	3	0	3	-2	3	-2	1	0	3	-1	3	0	2	-1.00	-1.00	1.00	-2.00	0.00	-0.50	-0.50		
Cotton	-2	3	-2	3	3	3	-3	3	-3	3	1	3	1	1	0	3	0	3	-3	2	-1.00	-0.67	-0.80	1.00	-3.00	-0.95	-0.87		
Cotton with liner	-1	3	-1	3	2	3	-3	3	-3	3	1	3	-1	1	-1	3	-1	3	-3	2	-1.00	-1.00	-1.30	1.00	-3.00	-1.08	-1.08		
Organic cotton	-2	3	-2	3	3	3	-2	3	-3	3	1	3	1	1	0	3	0	3	-3	2	-1.00	-0.67	-0.50	1.00	-3.00	-0.88	-0.79		
Organic cotton with liner	-1	3	-1	3	2	3	-2	3	-3	3	1	3	-1	1	-1	3	-1	3	-3	2	-1.00	-1.00	-1.00	1.00	-3.00	-1.00	-1.00		
Jute/ hemp/ bagasse	-2	3	-2	3	3	3	-2	3	-2	3	1	3	1	1	0	3	0	3	-2	2	-1.00	-0.67	-0.20	1.00	-2.00	-0.55	-0.47		
Jute/ hemp/ bagasse with liner	-1	3	-1	3	2	3	-2	3	-2	3	1	3	-1	1	0	3	0	3	-2	2	-0.50	-0.33	-0.70	1.00	-2.00	-0.55	-0.51		
Biopolymer (PLA)	0	3	0	3	1	3	1	3	-1	3	-1	3	-3	1	-2	3	-2	3	-3	2	-1.00	-1.33	0.00	1.00	-3.00	-1.25	-1.33		
Biopolymer (PHA)	0	3	0	3	2	3	1	3	-1	3	-1	3	-3	1	-3	3	-3	3	-3	2	-1.50	-2.00	0.30	1.00	-3.00	-1.30	-1.43		
Lyocell (rayon)	0	3	-1	3	1	3	-2	3	-2	3	1	3	1	1	-1	3	-1	3	-2	2	-0.75	-0.67	-0.80	1.00	-2.00	-0.64	-0.62		
Bamboo cellulose	-1	3	-1	3	2	3	-2	3	-2	3	1	3	1	1	0	3	-1	3	-3	2	-0.75	-0.67	-0.50	1.00	-3.00	-0.81	-0.79		