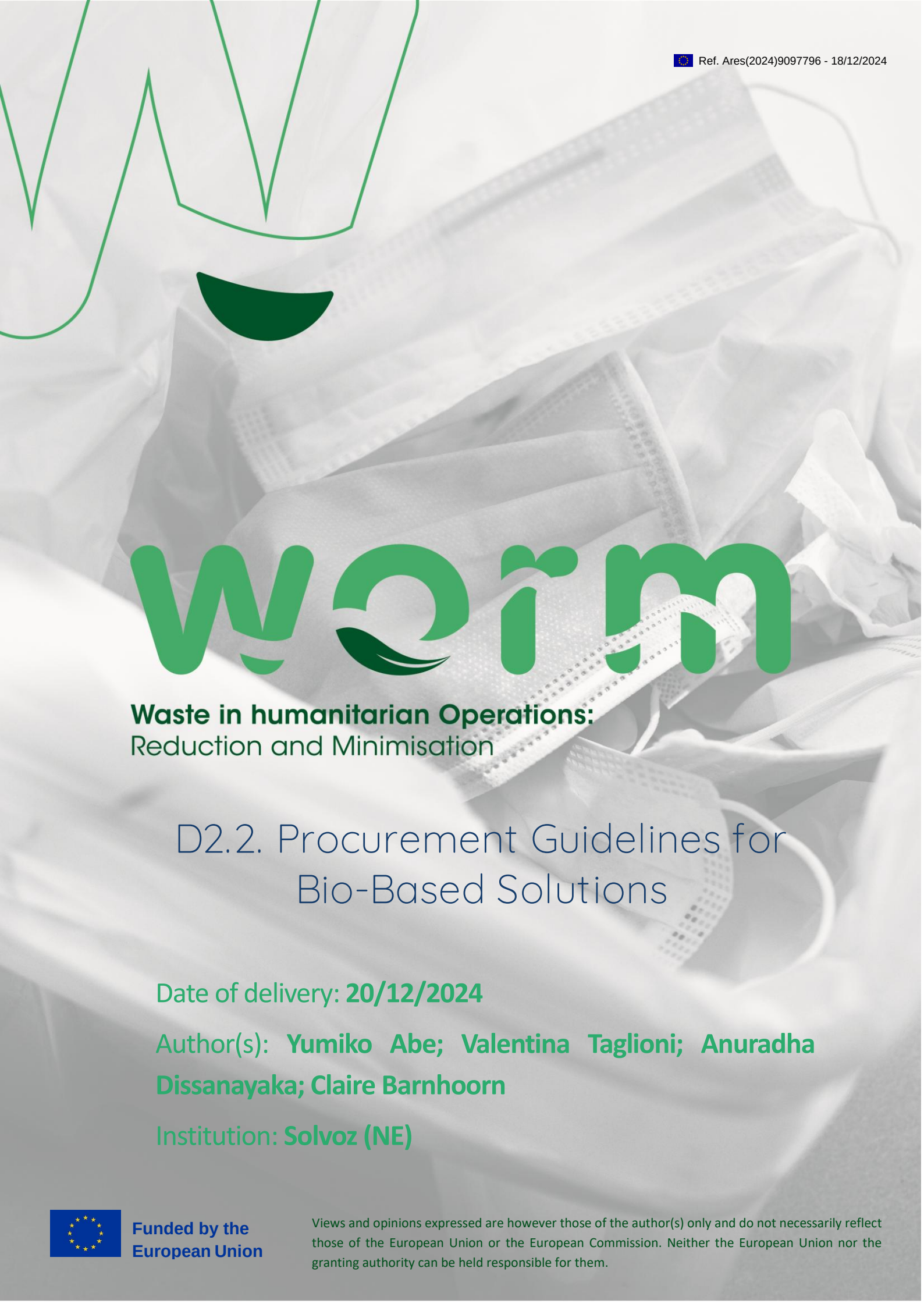

WORM

Waste in humanitarian Operations:
Reduction and Minimisation

D2.2. Procurement Guidelines for Bio-Based Solutions

Date of delivery: **20/12/2024**

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LIST OF ACRONYMS

ACRONYM	FULL NAME
EC	European Commission
EU	European Union
EU ESPR	European Union Ecodesign for Sustainable Products Regulation
GHG	Greenhouse gas
ICT	Information and communication technology
INGOs	International Non-Governmental Organisations
HQ	Headquarter
NGO	Non-Governmental Organisation
PPE	Personal protective equipment
UN SP	United Nations Sustainable Procurement
SDGs	Sustainable Development Goals
WORM	Waste in Humanitarian Operations

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BACKGROUND ABOUT WORM

WORM aims to design guidelines and support actions for circular economy in the humanitarian sector. It integrates bio-based technological solutions, leverages procurement for waste reduction, improves waste management methods and prioritises the sustainable livelihoods of waste pickers. WORM focuses on two selected settings: field hospital deployments and humanitarian livelihood programmes with a waste picking component. Following a collaborative and multi-actor approach, WORM brings together medical and humanitarian organisations, procurement service providers, logistics providers, waste management services and academic partners.

EXECUTIVE SUMMARY

This document is a deliverable of the WORM Project, funded under the European Union's Horizon Europe research and innovation programme under the grant agreement No 101135392.

The aim of this document is to describe how bio-based solutions and products can reduce environmental impacts of humanitarian operations, and to encourage humanitarian organizations to shift from fuel-based solutions to bio-based solutions. We first describe commonly recognised negative environmental impacts from the humanitarian operations, and how bio-based solutions can potentially mitigate such negative impacts. Then, we provide guidance on how to adopt bio-based solutions for humanitarian operations. A set of sustainability criteria (or targets) for adopting bio-based solutions and products are presented. These criteria are expected to shape the sustainable procurement policy and strategy of humanitarian organizations and facilitate the introduction of bio-based solutions in humanitarian procurement. Examples of more technical sustainability criteria for five target product groups of the WORM project are presented in Annex 2. Finally, barriers to adopting bio-based solutions are presented, followed by approaches to overcome these barriers. Overall, bio-based solutions can reduce the life cycle cost of humanitarian items, especially if the cost of waste management is considered. The importance of market development for bio-based solutions and products are highlighted with a strong emphasis on local sourcing as an effective measure to achieve global sustainable development goals.

1. Need for sustainable procurement in the humanitarian sector

Every year, international non-governmental organizations (INGOs) and local non-governmental organizations (NGOs) purchase products and services that are essential for the operation of their organizations at headquarter (HQ) level and missions. At the same time, these organizations recognize the potential negative impacts of the products and services during the operation. These negative impacts can be classified by environmental, social, and economic impacts following the same classification as the concept of sustainability. Main negative impacts are as follow:

Environmental impacts

- **Greenhouse gas (GHG) emissions:** High reliance on transportation (air, sea, or land) for delivering aid supplies increases greenhouse gas emissions.
- **Resource depletion:** Consumption of non-renewable resources (e.g., plastics in packaging and products like syringes or containers).
- **Waste accumulation:** Short-term usage of products leads to waste, especially single-use items like gloves and medical equipment, contributing to local environmental degradation.
- **Pollution:** Hazardous waste, such as vehicle oil, chemical residues or medical sharps, often lacks proper disposal, contaminating the environment.
- **Energy use:** Operational facilities often use non-renewable energy sources, amplifying the environmental footprint of such facilities.

Social impacts

- **Labor issues:** Sourcing and manufacturing in regions with weak labour laws can lead to worker exploitation, unsafe working conditions, and violation of rights.
- **Human health:** Improper disposal of humanitarian products, such as medical waste incineration, creates health risks for local communities.
- **Dependency:** Overreliance on externally supplied products can discourage local production and economic resilience.

Economic impacts

- **Cost inefficiency:** Short lifecycle and high transport costs increase long-term operational expenses.
- **Market disruption:** Flooding local markets with foreign goods can displace local suppliers, reducing regional economic growth opportunities.
- **Inequitable access:** High procurement costs for sustainable or locally-sourced alternatives can marginalize local suppliers and beneficiaries.

Mitigating these impacts requires adopting sustainable procurement practices. Indeed, the humanitarian sector faces growing interest in adopting sustainable practices in its operations, particularly in procurement, and the shift to bio-based solutions (products) can potentially offer an opportunity to reduce environmental impact, support local economies, and contribute to several Sustainable Development Goals (SDGs).

1.1. Introduction to bio-based solutions

Bio-based products, derived from renewable biological resources such as plants, animals, or microorganisms, provide an alternative to fossil-based products. They present numerous advantages, including lower carbon footprints, biodegradability (although not applicable for all bio-based products), and potential for local production. However, adopting bio-based solutions requires informed decision-making to balance sustainability with cost, quality, and operational requirements.

This document outlines actionable steps for integrating bio-based solutions into procurement decisions, emphasizing a life cycle approach to assess environmental, social, and economic impacts. By offering specific evaluation criteria for bio-based alternatives, it seeks to address the challenges and opportunities within the humanitarian sector. The objective of this document; hence, is to assist humanitarian actors in identifying, assessing, and integrating bio-based alternatives for achieving more sustainable procurement practices.

1.2. Why bio-based solutions for the humanitarian sector?

Potential benefits of integrating bio-based products in humanitarian procurement arise directly from the bio-based nature of each product:

- Improved resource efficiency
- Transition from the fossil-fuel economy
- Reduced GHG emissions
- Reduced toxicity (avoidance of hazardous substances)
- Creation of healthier environments and improved public health
- Mitigation of waste generation (if biodegradable)
- Initiation of the secondary material market and circular economy at a local scale
- Promotion of innovation

Improved resource efficiency

Bio-based products can be made of production by-products, recycled and/or waste materials. Typical production by-products used in bio-based products include forestry waste, agricultural by-products and waste, and green waste in general.

Transition from the fossil-fuel economy

Many humanitarian items and products are made of plastics. With the advancement of material science, there are many bio-based plastics that are suitable to produce these humanitarian products. Bio-based plastics are often called bioplastics, and some of bioplastics are biodegradable. In addition, bio-based fuel can replace petrochemical fuels.

Reduced GHG emissions

GHG emissions are lower for bio-based products (including production phase) although the level of emissions depends on the biomass cultivation methods and location of cultivation.

Reduced toxicity

Bio-based products are generally derived from renewable, natural sources such as plants, microorganisms, or animal materials, and are designed to minimize environmental and health impacts. Unlike petrochemical-based counterparts, bio-based materials typically lack synthetic additives, heavy metals, or harmful byproducts like volatile organic compounds and polycyclic aromatic hydrocarbons,

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which are common in petroleum-derived goods. These synthetic substances are often responsible for toxicity in petrochemical products, leading to air, water, and soil pollution and adverse health effects.

Furthermore, bio-based products are biodegradable or compostable in many cases, reducing their potential to release toxins during degradation. The production processes for bio-based materials also often emphasize sustainability and reduced chemical usage. By avoiding harmful petroleum-based inputs, bio-based alternatives can significantly lower risks to human health and ecosystems, making them safer and more sustainable choices for diverse applications.

Creation of healthier environments and improved public health

Bio-based products promote healthier environments and public health by reducing reliance on toxic chemicals commonly found in petroleum-based alternatives. Bio-based products often exclude hazardous additives and heavy metals that contribute to air and water pollution and pose health risks.

Mitigation of waste generation

Some bio-based materials are biodegradable, minimizing environmental contamination, ensuring safer ecosystems. The production of bio-based products typically generates fewer GHG emissions, reducing the public health impacts of climate change.

Initiation of the secondary material market and circular economy

Bio-based products encourage the development of secondary material markets and a circular economy by utilizing renewable resources that are often biodegradable or recyclable. Their production and end-of-life management align with principles of resource recovery, such as composting or material reprocessing, so it reduces waste generation. Bio-based alternatives also create demand for agricultural residues or waste, integrating these materials into supply chains. This approach promotes closed-loop systems, reducing dependence on virgin resources while generating economic opportunities in recycling and bio-based product manufacturing, advancing sustainability and resource efficiency.

Promotion of innovation

Bio-based products drive innovation in both developed and developing countries by encouraging local production and resource utilization, supporting local economies. Using readily available agricultural and organic waste as feedstock reduces reliance on costly imports. This creates opportunities for small-scale industries and skills development while addressing environmental challenges. By encouraging locally tailored solutions, humanitarian procurement can stimulate technological advancements and sustainable practices in resource-limited settings, promoting resilience and economic empowerment.

2. How to adopt bio-based solutions in humanitarian procurement?

For bio-based solutions and products to be integrated into humanitarian procurement options, it is necessary to perform the following steps:

- Assess the market
- Develop an appropriate procurement procedure
- Specify tender requirements

2.1. Assess the market

It is essential to have some knowledge of the market such as the availability, cost, and practical implications of bio-based alternatives. Simple online market research can help to provide some basic information, but in-depth market assessment is necessary beforehand to establish a reliable set of criteria

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for tendering. To get a more detailed understanding from the market, it is recommended to engage in dialogue with potential suppliers prior to tendering. Informing the market in advance about tenders that will include bio-based related criteria will result in fair and constructive tender processes as it will give suppliers sufficient time to prepare for the requirements set by your organization.

What to Consider?

- **Context assessment:**
  - Evaluate the country's specific certifications and labels that ensure adherence to sustainability practices.
  - Analyse legislation and policies that influence sustainability at a national level.
- **Market level of maturity:**
  - Assess the readiness and development stage of the market in adopting sustainable practices.
  - Examine trends in sustainable product availability (local, regional, international).
- **Certifications & labels:**
  - Identify recognized certifications and labels that verify the sourcing of bio-based solutions and their sustainability.

How to approach?

- Focus on the legal and institutional frameworks within the target country.
- Collaborate with stakeholders to gather insights on current sustainability benchmarks and challenges.

2.2. Develop an appropriate procurement procedure

It is essential to establish clear, tailored procurement procedures. These procedures should incorporate criteria to evaluate bio-based products' environmental, social, and economic benefits, align with local contexts, and ensure transparency. By integrating life cycle considerations, quality standards, and supplier capabilities into decision-making processes, organizations can effectively adopt sustainable practices while supporting innovation and circular economies in line with humanitarian goals.

Comparative Bid Evaluation

To ensure consistency and fairness in the bid evaluation process, it is essential to develop a standardized scoring and weight matrix that aligns with the project's sustainability goals. The evaluation framework should be structured around three primary criteria: environmental, social, and economic sustainability. Each criterion should include specific sub-criteria (see Table 1 for more information), such as carbon footprint reduction, waste management practices, and renewable energy integration for environmental factors; support for local communities, fair labour practices, and health and safety compliance for social considerations; and cost-effectiveness, financial viability, and value-added contributions for economic aspects.

Additional points should be awarded to suppliers who propose innovative solutions that exceed minimum sustainability requirements. This approach not only promotes innovation but also ensures alignment with the project's broader sustainability objectives.

2.3. Specify tender requirements

As for the traditional tender process, bio-based solutions to be sought would require technical specifications, selection criteria, and award criteria. The particularity of sustainable procurement, such as bio-based solutions, is the following:

- Inclusion of sustainability targets or criteria (at supplier-level and/or product-level)

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- Life cycle cost considerations

Sustainability targets and criteria

Based on the frameworks of UN SP indicators and Ecodesign requirements from EU's ESPR, the next section presents the sustainability targets to be sought by your organization according to the policy and strategy of the organization. The listed targets are taken directly from UN SP indicators and Ecodesign requirements, and they shall be used **individually or in combination** as a basis for selecting more sustainable suppliers and/or products. Only the sustainability targets related to adopting bio-based solutions and products are selected.

2.3.1. Sustainability Dimension Criteria

Environmental

Environmental supplier-level sustainability focuses on integrating eco-friendly practices into the operations and supply chain of suppliers. Key criteria include the prevention of pollution, promoting climate change mitigation strategies, and protecting biodiversity and natural habitats. Efficient use of resources such as water, energy, and materials are prioritized to minimize waste and maximize sustainability. Suppliers are encouraged to adopt practices that reduce their environmental impact, ensuring their operations align with global goals for environmental conservation and sustainable development.

Supplier-level sustainability

- Prevention of pollution
- Climate change mitigation
- Protection of the environment, biodiversity and restoration of natural habitats
- Water use & water efficiency
- Resource use & resource efficiency
- Energy use & energy efficiency

Product-level sustainability criteria

- Prevention of pollution (end-of-life management system)
- Sustainable resource use
- Social health and well-being (hazardous chemicals)
- Durability
- Reliability
- Reusability
- Repairability
- The possibility of maintenance and refurbishment
- The presence of substances of concern
- Resource use & resource efficiency
- Recycled content
- The possibility of remanufacturing
- Recyclability
- The possibility of the recovery of materials
- Environmental impacts, including carbon footprint and environmental footprint

Social

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Social supplier-level sustainability criteria focus on ensuring ethical and inclusive practices throughout the supply chain:

- Human rights and labour issues
- Inclusion of persons with disabilities
- Gender issues
- Social health and well-being

Economic

Economic supplier-level sustainability focuses on fostering long-term financial resilience and inclusivity within the supply chain. This involves supporting local communities and promoting supplier diversity, particularly by engaging Micro, Small, and Medium Enterprises (MSMEs). Suppliers are encouraged to adopt practices that distribute economic benefits fairly, stimulate local economies, and create job opportunities.

Supplier-level sustainability criteria

- Local communities, MSMEs, and supplier diversity
- Promotion of sustainability through the entire supply chain

Product-level sustainability criteria

- Use of whole life costing methodology

2.3.2. Life cycle cost considerations

The life cycle cost approach evaluates the total cost of a product or service over its entire life cycle, including acquisition, operation, maintenance, and disposal costs. It moves beyond the initial purchase price to account for long-term financial and environmental impacts. Adopting the life cycle cost approach ensures more sustainable and cost-effective choices, promoting durability, efficiency, and reduced waste, aligning with broader sustainability goals.

The figure below represents the concept of life cycle costing. Organizations must decide to which extent they wish to extend their responsibilities when purchasing items, and consider the hidden costs associated with different product life cycle expressed on the y-axis in Figure 1.

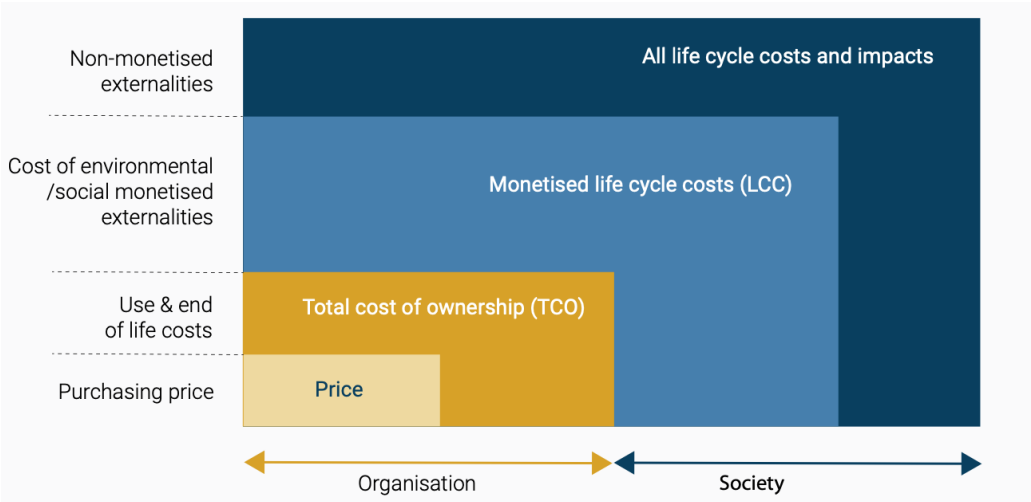

Figure 1: Schematic representation of different cost evaluation approaches (UNEP 2021)

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3. What product groups to start with?

When identifying product groups to replace with bio-based alternatives in humanitarian procurement, focus on areas with significant potential for impact. High-volume purchases are a logical starting point, as transitioning such items to bio-based alternatives can significantly reduce environmental footprints. Products frequently used and disposed of, like single-use items, are particularly impactful. However, prioritizing reusable alternatives over single-use items aligns more closely with circular economy principles. Table 1 describes potential product groups for bio-based solutions.

Another consideration is environmental sensitivity—products with high carbon footprints or toxic production processes should be prioritized for bio-based alternatives. Items commonly disposed of in humanitarian contexts, such as medical waste or packaging, may provide substantial opportunities for reducing waste and fostering sustainable waste management practices. Finally, consider the local context. Products with bio-based alternatives that can be sourced locally can support regional economies and reduce transportation emissions. These criteria ensure that the adoption of bio-based solutions maximizes environmental, social, and economic benefits.

3.1. Relevant product groups

Table 1 List of potential product groups for bio-based solutions (modified from A.I.S.E. 2017)

PRODUCT GROUPS	DESCRIPTION
Food, catering and events	Disposable cups and tableware from bio-based polymers Packaging materials and utensils from bio-based polymers
Hospitals and laboratories	Disposable lab materials: tubes, gloves, petri dishes Disposable nursing articles: bedpans, urinals, gloves, bed sheets, towels Textiles for health-care personnel
ICT & office supplies	Office supplies from bio-based composites Toner for cartridge
Vehicles and mobility	Tires from natural rubber or other innovative materials Light weight automobile interior parts Bio-based lubricants for vehicles and tools
Cleaning, hygiene & sanitary	Bio-based cleaning detergents including bio-based surfactants Biodegradable plastic bags for disposal & other materials relevant for hygiene
Construction materials	Wooden-frame construction bio-based insulation, decking, facade panels
Furniture and indoor interiors	Office furniture from bio-based composites Office upholstery and carpets from bio-based polymer fibres Other innovative bio-based man-made textiles for interior
Distribution items	Some plastic items can be replaced by bio-based alternatives (jerry cans, blankets, sanitary pads, etc.)
Packaging materials	Humanitarian logistics require various levels of packaging to protect the products. Packaging materials can be replaced by bio-based alternatives.

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3.2. Examples of biomaterials in bio-based products

With the advancement of material science, there are numerous bio-based materials that could be incorporated into items procured by the humanitarian sector. Examples of such materials are summarized in the following tables (Table 2 for natural materials and Table 3 for bio-based synthetic materials or 'bioplastics').

Table 2 List of natural materials suitable for bio-based products.

NATURAL MATERIALS	DESCRIPTION AND APPLICATIONS
Natural rubber	Sourced from latex extracted from rubber trees. Applications: Gloves, mattresses, medical tubing, and footwear.
Hemp fiber	Derived from the hemp plant. Applications: Textiles for clothing, bags, tents, and biodegradable composites for construction.
Wood	Sourced from sustainably managed forests or recycled sources. Applications: Temporary shelters, pallets, furniture, and tools.
Bamboo	A rapidly renewable resource. Applications: Flooring, cutlery, plates, and sanitary items.
Paper and Cardboards	Made from wood pulp or recycled fibres. Applications: Packaging, documentation, insulation, and disposable items (e.g. plates or hygiene products).
Bagasse	A byproduct of sugarcane processing. Applications: Biodegradable food containers, plates, and packaging.
Cork	Harvested from cork oak trees. Applications: Insulation, flooring, and lightweight building materials.
Cotton and Jute	Natural fibres grown as crops. It can be from recycled sources. Applications: Bags, ropes, tarpaulins, and other textiles.
Wool	Obtained from the fleece of sheep and other animals like alpacas, goats (cashmere, mohair), and llamas. It can be from recycled sources. Applications: Warm blankets for cold climates and emergency shelters.
Wood-based cellulose	Extracted from sustainably managed forests. Applications: Bio-based filters, hygienic wipes, paper products, and insulation materials.
Chitosan	Derived from the shells of crustaceans or fungi. Applications: Wound dressings, biodegradable coatings, and water filtration membranes.

Table 3 List of bioplastics suitable for bio-based products.

BIOPLASTICS	DESCRIPTION AND APPLICATIONS
Bio-based polyethylene	Produced from bio-ethanol derived from sugarcane or other crops. Applications: Packaging materials, water containers, and plastic films.
Bio-based polypropylene	Made from bio-derived feedstocks such as vegetable oils. Applications: Durable containers, textiles, and automotive parts.
Polylactic acid	Derived from corn, sugarcane, or cassava starch. Applications: Biodegradable packaging, disposable utensils, and medical items like syringes or containers.
Soy protein-based polymers	Created from soy protein isolate. Applications: Adhesives, coatings, and composites.
Biodegradable polyhydroxyalkanoate	Produced by microorganisms through the fermentation of organic feedstocks. Applications: Medical devices, sutures, and packaging.
Algae-based materials	Extracted from algae biomass. Applications: Bioplastics, textiles, and biofuels.
Starch-based polymers	Derived from corn, potatoes, or wheat. Applications: Packaging materials, cutlery, and disposable items.

Bio-based product selection guidance

Bio-based products should be sourced sustainably. Some considerations include:

- Materials should be renewable
- Production of the material should not affect food security
- Production of the material should not result in the loss of ecosystems
- Entire value chains must satisfy the social requirements such as human rights and responsible labour practices.
- Encourage local sourcing and production to support community resilience

4. Barriers to adopting bio-based solutions

It is important to note the characteristics of bio-based solutions and products, as well as the barriers to their implementation. There are five main barriers as listed below:

- **Financial barrier:** the capacity to allocate the required financial resources for the projects and expected to be the most common barrier. It arises from the observation that bio-based alternatives usually carry a price premium over standard conventional products.
- **Awareness barrier:** the lack of motivation or knowledge from the humanitarian sector to implement bio-based solutions and products in their programmes. It arises from multiple factors including priorities on other urgent activities (business-as-usual issues), limited understanding of the benefits, misguided and misinformed perceptions.
- **Capacity barrier:** the lack of capacities of the humanitarian organizations to develop and implement bio-based solutions and products.

- **Regulatory barrier:** current policies and regulations (such as safety and hygiene regulations) which hinder the purchase of bio-based solutions and products.
- **Market barrier:** the limited availability of bio-based solutions and products accessible to humanitarian organizations.

5. Overcoming the adaptation barriers

To address the barriers to adopting bio-based solutions in the humanitarian sector, a combination of strategic, collaborative, and educational approaches can be employed:

Financial barriers

It is important to consider the life cycle cost approach to evaluate the long-term economic benefits of bio-based solutions, including reduced waste management costs due to biodegradation and potential savings from local sourcing. In addition, there may be sustainable funding mechanisms, such as subsidies, grants, or public-private partnerships, to offset initial higher costs associated with bio-based products.

Awareness barriers

Organizations can collaborate to develop targeted awareness campaigns for procurement officers and stakeholders and highlight the environmental and economic benefits of bio-based products through case studies, training programs, and workshops. Sharing success stories can motivate a broader understanding and acceptance of these solutions.

Capacity barriers

The humanitarian sector can build cross-sectorial capacity by training procurement teams to gain market intelligence and to evaluate bio-based alternatives effectively. Establishing resource- and information-sharing platforms and technical support networks to ensure consistent access to updated tools, guidelines, and supplier information would pave the pathway to adoption of bio-based solutions and products.

Regulatory barriers

It is important to engage with regulatory bodies to harmonize standards for bio-based products adopted to the humanitarian sector, making them easier to integrate into procurement processes. Each organization can advocate for inclusive policies that consider local contexts and accessibility for suppliers from developing countries.

Market barriers

It is essential to support market development for bio-based products by building partnerships between suppliers and humanitarian organizations. Such partnerships can include market-shaping strategies, such as guaranteeing purchase volumes, to incentivize investment in bio-based production. More importantly, organizations should collaborate with local suppliers to expand the availability of bio-based options tailored to humanitarian needs. Such collaboration can achieve not only the needs of the humanitarian sector, but also the global sustainable development goals.

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6. Next steps for bio-based integration

Adopting bio-based solutions in humanitarian procurement is an indispensable step toward aligning humanitarian operations with sustainability goals. These solutions address critical environmental, social, and economic impacts, promoting resilience within the humanitarian sector while reducing unintended negative impacts. However, this transition demands a thoughtful, strategic approach.

Organizations are encouraged to set clear sustainability goals and integrate sustainability criteria for these solutions into procurement policies. It is necessary to start by targeting high-impact product groups with large market availability, and gradually expand adoption based on lessons learned within the sector. Simultaneously, it is pivotal to develop partnerships with suppliers and engage in capacity-building initiatives in the long term. In addition, the humanitarian actors must align efforts to create a large demand to influence the market trends to ensure suppliers' investment and competitiveness.

It is also essential to embrace the life cycle cost evaluation and adapt procurement practices to emerging technologies and local contexts. Acknowledging upfront financial constraints, humanitarian actors must evaluate long-term cost-effectiveness and advocate for funding mechanisms that support sustainable procurement of bio-based solutions.

While bio-based solutions are not a universal fix, their potential to reduce environmental footprints, create healthier environments, and stimulate local economies must be recognized by the humanitarian sector.

References

- A.I.S.E.(2017), Guiding principals on “sustainable sourcing of bio-based materials”
- European Union (2017), Public procurement for a circular economy: Good practice and guidance
- European Union (2024), Regulation (EU) 2024/1781 of the European Parliament and of the Council of 13 June 2024 establishing a framework for the setting of ecodesign requirements for sustainable products, amending Directive (EU) 2020/1828 and Regulation (EU) 2023/1542 and repealing Directive 2009/125/EC (Text with EEA relevance)
- InnProBio (2017), Handbook on the public procurement of bio-based products and services
- OECD(2024), Harnessing Public Procurement for the Green Transition: Good practices in OECD Countries, OECD Public Governance Reviews, OECD Publishing, Paris.
- UNEP (2021) Sustainable Public Procurement How to “Wake the Sleeping Giant”
- United Nation (2021), Sustainable Procurement Indicators Guidance: Guidance on how to choose the right sustainability indicator on UNGM

ANNEX 1: WORM Target product groups

1. **Personal Protective Equipment (PPE**): Includes gloves, masks, and gowns, which are critical for infection prevention and control. Bio-based materials can offer alternatives such as biodegradable polymers or plant-based fibres
2. **Syringes and Needles**: Essential for medical interventions, bio-based options focus on renewable or compostable materials that meet sterility and performance standards.
3. **Sharp Containers:** These ensure the safe disposal of medical sharps. Alternatives may involve durable, bio-composite materials designed for safe use and eco-friendly disposal.
4. **Body Bags:** Used for dignified handling of remains, bio-based options can replace traditional polyethylene bags with biodegradable materials that meet operational requirements.
5. **Temporary Water/Sludge Bladders**: Deployed in Water, Sanitation, and Hygiene operations, bio-based solutions may include materials that balance durability with environmental benefits.

ANNEX 2: Product specifications and sustainability criteria for 5 target products

Sustainability criteria are integrated in the format of supplier's questionnaire in the WORM portal site (https://worm.solvoz.com). The structure of relevant sustainability criteria is summarized below:

Table 4 Structure of sustainability criteria for supplier- and product-levels.

SUPPLIER-LEVEL CATEGORIES	RESPONSE
Production energy source	Electricity
	Natural Gas
	Renewable Energy
	Other (Please Specify)
Renewable energy usage (if renewable energy is selected)	1%-25%
	26%-50%
	51%-75%
	76%-100%
	Unknown

Table 5 Product-specific material types in the questionnaire.

PRODUCT-LEVEL CATEGORIES	RESPONSE LEVEL 1	RESPONSE LEVEL 2
Product specific material type	See the product specific material types table	
Recycled content (if recycled material is used)	1%-25%	
	26%-50%	
	51%-75%	
	76%-100%	
	Unknown	
Presence of hazardous substances	Specify: Stockholm convention, EU's REACH, USA's TSCA, or other regional and national regulations	
Product-level carbon footprint assessment	Water usage	
Packaging material type	Virgin material	paper
		plastics
		other (please specify)
	Renewable material	paper
		bioplastics
		other bio-based material (please specify)

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	Recycled material	recycled paper
		recycled plastic
	Other (please specify)	
If recycled material, recycled content	1%-25%	
	26%-50%	
	51%-75%	
	76%-100%	
	Unknown	
Packaging reduction measures	Compliance to standards	ISO 18601
		EU's Packaging waste directive
		other (please specify)
Product longevity	Single-use	
	Reusable	Number of uses before replacement
		Recommended cleaning procedure
End-of-life management	Biodegradablility of the product	Industrial composing facility
		Home composting
		landfill conditions
		Natural outdoor environment
		other (please specify)
	Biodegradablility of the packaging material	Industrial composing facility
		Home composting
		landfill conditions
		Natural outdoor environment
		other (please specify)
	Recyclability of the product	
	Recyclability of the packaging material	
	Do you provide a take-back program	
Sustainability certification	Please specify	
Future improvement	Please specify	
Environmental impact awareness	Please specify	

Table 6 Product-specific material types in the questionnaire.

PRODUCT GROUP	RESPONSE LEVEL 1	RESPONSE LEVEL 2
Sharps bins	Non-renewable material	High-Density Polyethylene (HDPE)
		Polypropylene (PP)
		Polyethylene Terephthalate (PET)
		Polyethylene (PE)
		Other (Please Specify)
	Renewable material	Cardboard
		Other (Please Specify)
	Recycled material	Cardboards
		High-Density Polyethylene (HDPE)
		Polypropylene (PP)
		Polyethylene Terephthalate (PET)
		Other (Please Specify)
Surgical gowns	Non-renewable material	Polyethylene (PE)
		Polypropylene (PP)
		Polyester
		Nylon
		PVC
		Other (Please Specify)
	Renewable material	Denim
		Cotton
		Paper
		other (please specify)
	Recycled material	Plastics
		Denim
		Cotton
		Paper
		Other (please specify)
Gloves	Non-renewable material	Nitrile rubber
		PVC
		Polyethylene (PE)
		Polyisoprene
		Neoprene (polychloreprene)
		Other (Please Specify)
	Renewable material	Natural rubber latex
		other (please specify)
	Recycled material	Please specify
Facemasks	Outer layer	Please specify
	Middle filtration layer	Please specify
	Inner layer	Please specify

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	Nose wire	Please specify
	Ear loops	Please specify
	Other	Please specify
Syringes and needles	Barrel	please specify
	Plunger	please specify
	Needle	please specify
	Cap	please specify
	Tip	please specify
	Other	please specify
Body bags	Outer layer	
	Inner layer	
	Absorbent pad	
	Zipper	
	Handles	
Temporary water/sludge bladder	Bladder shell	
	Inner layer (liner)	
	Reinforcement layer	
	Inlet and outlet fittings	

worm

Waste in humanitarian Operations:
Reduction and Minimisation

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