

# UNHCR Environmentally Friendly Procurement

## DOCUMENT VERSION

The third version of the multipurpose solar lantern includes enhanced sustainability attributes, representing UNHCR's ongoing commitment to advancing the environmental, technical, social, and economic sustainability of core relief items, as of **October 3, 2024**.

## MULTIPURPOSE SOLAR LANTERN, ECO-DESIGN WITH UNHCR LOGO

Providing material assistance to forcibly displaced populations is fundamental to UNHCR's protection mandate. In an emergency, solar lanterns are one of the essential items that UNHCR distributes to assist the affected populations. Multipurpose solar lanterns should provide the end users with indoor and outdoor lighting in camps and shelters. Additionally, they will also have a provision to charge mobile devices.

## END USERS

UNHCR is mandated to protect and assist refugees, internally displaced, and stateless people. The product with this specification will be used by the people we protect, primarily in emergencies. The end users include people of all ages ranging from infants to older persons, persons with disabilities, and pregnant women. Therefore, the supplier needs to understand and study the needs of a forcibly displaced population, especially in emergencies, to ensure an innovative and sustainable product design that is user-centered.

## SUSTAINABLE SUPPLY CHAIN

For UNHCR to fulfill its obligations and strategic commitments, it is imperative to minimize the environmental footprint of humanitarian assistance. Our approach to a sustainable end-to-end supply chain includes planning, sourcing, material, manufacturing processes, procurement, delivery, and lifecycle management of goods (cradle to gate approach).

A holistic assessment of sustainable products includes but is not limited to, the following criteria:

- The product design follows Universal Design principles that are user-friendly and accessible.<sup>1</sup>
- Manufacturing processes take into consideration the protection of the environment and respect for social standards.<sup>2</sup>
- Products are made from sustainable materials, and through sustainable mechanisms.
- Packaging is made from sustainable material, ideally with a second-life purpose.
- All unnecessary single-use plastic is removed.<sup>3</sup> The primary packaging should include information regarding the product's origin, as well as details about the recyclability of both the material and the packaging.
- Packaging, palletizing, and load ability of transport units are optimized.
- Products and packaging are, to the maximum extent possible are repairable and recyclable (according to international norms).
- A life cycle analysis, including GHG emission factors, is performed and shared with UNHCR for all products.
- The geographical distribution of the supplier base is diversified to ensure the proximity of product delivery.
- The products are energy efficient, durable, and compliant with all applicable international and local standards.

## PREFERENCE

Preference will be given to a product that is most user-friendly and has the highest overall sustainability elements that satisfy technical specifications. Please see the Sustainability Procurement Indicators from the United Nations Global Market that we comply with.<sup>4</sup>

1 [Universal Design Principles](#)

2 Suppliers to demonstrate the application of ISO 14001:2015: Environmental managing systems, ISO 9001:2015: Quality Management systems, ISO 26000: Guidance on social responsibility

3 [Single-use plastics: A roadmap for sustainability](#)

4 [Sustainable Procurement Indicators \(ungm.org\)](#)

Item Application Sample



General information and description

A multipurpose solar lantern is a device that ensures indoor and outdoor lighting for individuals and families as well as mobile device charging in camps, settlements, private accommodations, and outdoor settings.

**Note: The above images are for reference purposes only.**

Minimum packaged components

A multipurpose solar lantern kit consists of:

1. A solar photovoltaic (PV) panel.
2. A rechargeable battery component.
3. Lamp/ LED lighting component.
4. Durable housing/casing connected by screws or bolts in a way that allows easy assembly and disassembly. The lighting modules are placed behind a (semi) transparent luminous plexiglass screen.
5. One (USB-A) or optionally multiple external charging ports / jacks.
6. At least one button/switch (on/off/luminous intensity levels).
7. A battery charging cable/ Mobile device charging cable.
8. User/Instruction manual and Warranty card.

Design restrictions/recommendations

To avoid overheating of the battery, the solar lantern should be separated from the PV panel. It is recommended the entire electronics should be on a single PCB, which can be replaced easily (plug & play) using a simple screwdriver. There is a safety provision circuit to avoid overcharging and deep discharge that would reduce the lifespan of the battery.

User-friendly optional features

1. Multi color battery status indication light on the lantern
2. A multi color charging Indication light on the lantern
3. The lantern may be capable of providing light and simultaneously recharging mobile phone (multi-operability function).
4. USB ports in lantern housing may have protection on it to prevent water or debris intrusion.
5. A siren/ alarm or an indication light help locate people in case of an alarm or a threat.
6. Optional provision to charge the battery via USB from an external AC or DC conventional source.

Product weight

The product's net weight (excluding packaging) should fall within the range of 0.2-1.0kg\* (complete solar lantern kit). Products with lower weight contribute to minimizing the environmental impact, therefore, preference will be given to solutions that have weight within the range, without compromising quality, durability, and performance.

\* The maximum weight of the product should not exceed 1kg (excluding packaging)

Placement Features of the solar lantern

The lantern should be designed in a way that enables multipurpose use. It should be able to stand sturdy on a flat surface and to be hung on a hook. Compact and lightweight hanging is required. The lantern should not contain sharp edges and it should have fixed/ adjustable handle for flexible use.

Multipurpose end usage: Desk/ flat surface placement, ceiling mount, wall mount, multipurpose/ handheld. Other innovative and user-friendly solutions are welcome.

The volume of the packed product

A complete solar lantern kit should have a lightweight and compact universal design, which enables compact packaging together with cabling and all the other supplementary devices. The maximum gross volume of the packed solar lantern kit should not exceed 0.005 m3.

Products with lesser volume contribute to minimizing the environmental impact, therefore, preference will be given to solutions that have the least volume without compromising quality, durability, and performance.

Material composition

**Cables (option 1):** PVC-free cables.

**Cables (option 2):** Cables for solar lantern can be made of PVC (polyvinyl chloride). In this case, no degassing should occur up to 70°C operating temperature.

**Solar lantern housing** and other structural elements (such as PV panel frames) should be made of plastic, such as Acrylonitrile Butadiene Styrene (ABS), Polycarbonate (PC), Polypropylene (PP), or others. Alternatively, a PV panel frames can be made of aluminum. The materials of the housing should be sustainable and environment friendly.

Preferences will be given to those products which contain less total plastic and the highest percentage of post-consumer recycled (PCR) plastic. The content of recycled plastic should be proved by a sustainability certificate. The Lifecycle Analysis/ Product Environment Profile should be conducted and should be within acceptable sustainability limits.

Restricted colors: no military/camouflaged colors are to be used.

Drop test

Multipurpose lighting components: Six out of six samples have no damages and are functional after the drop test (one meter onto concrete); none result in dangerous failures (Verasol 2018b).

UNHCR may carry out ad-hoc tests as its own discretion to verify the quality and performance of the product.

**Technical specification for a multipurpose solar lantern**

<b>Soldering and electronics quality</b>	The system and any included appliances must be rated "Good" for workmanship quality as defined in IEC TS 62257-9-5 & 8.
<b>Environmental durability</b>	<b>Preferred Climate – range of temperature for operation:</b> -10°C to + 55°C <b>Ingress protection rating (IP) of the Multipurpose Solar Lantern Kit:</b> ≥ IP 63
<b>Battery requirements</b>	
<b>Battery chemistry, hazardous substances limitations</b>	Lithium-ion batteries or equivalent technology. No battery may contain cadmium or mercury at levels greater than trace amounts (<0.0005% Hg and <0.002% Cd by weight). All components must hold the EU RoHS-6 requirements or equivalent. Lithium-ion requires a declaration for transport of dangerous goods, under UN3481 or equivalent. The battery chemistry and substances should be IATA compatible.
<b>Battery durability</b>	The average capacity loss of six samples must not exceed 25%, and only one sample may have a capacity loss greater than 35% following the battery durability storage test as defined in IEC 62257-9-5.
<b>Minimum number of full cycles for the battery</b>	All samples and any included appliances are functional after 2,000 battery cycles (above Verasol 2018b). The battery needs to be conformed to IEC 61427-1 standard.
<b>Battery operating voltage</b>	≥ 2.5 V
<b>Battery capacity</b>	Rechargeable, battery, adequate for 500 Lumen/ hours or equivalent setting.
<b>Minimum operating hours at each brightness setting (powered by battery only)</b>	At highest brightness setting/ mode ≥ 5 hours At lowest brightness setting/ mode ≥ 12 hours
<b>Battery charging efficiency</b>	≥ 90%
<b>Possibility of battery replacement</b>	Easy replacement of the battery that can be carried out by the end-user or non-skilled personnel. RoHS-compliant (Restriction of Hazardous Substances) or equivalent. Compliant with EN 45554 (repairability) or equivalent.
<b>Spare batteries</b>	Guaranteed availability of spare parts for at least the rated life of the lanterns provided by the same suppliers.
<b>Battery protection</b>	Protected by an appropriate charge controller that prolongs battery life and protects the safety of the user. Lithium-ion batteries shall meet the requirements of a standard that ensures safety during use. Test reports from accredited laboratories shall cover both the individual cell and the fully assembled battery pack (International Electrotechnical Commission 2020). Lithium-ion batteries must carry IEC 62281, IEC 62133-2, UL 1642 or UN 38.3 certification and have overcharge protection for individual cells or sets of parallel-connected cells. Batteries of included appliances must also meet this standard (International Electrotechnical Commission 2020; Verasol 2018b). For PAYG systems, appropriate battery protection must remain active regardless of whether the system is in an enabled or disabled state. To avoid damage to a battery during long-term periods of non-payment disabled system status, the solar module must be able to charge the battery even if the product is in a disabled state (Verasol 2018b). Six out of six samples must meet the requirements outlined above under this section.
<b>Minimum battery shelf life after delivery</b>	≥ 12 months
<b>Battery Specification Sheets</b>	A specification sheet from the battery manufacturer, showing at a minimum acceptable deep discharge protection and overcharge protection thresholds, shall be provided for all batteries. This information shall be made available to UNHCR. Manufacturers' declaration on battery chemistry and a safety data sheet (SDS) or similar documentation should be provided for all batteries (according to the International Electro technical Commission 2020).

**Lamp/ LED Lighting Component requirements**

<b>Light performance</b>	If a lantern contains multiple LEDs, one faulty LED does not disable the operations/ working of the entire solar lantern kit. At least two light brightness modes/settings in between the minimum and maximum threshold below: Minimum/ lowest lumen setting ≥ 10 lm Maximum/ highest lumen setting ≤ 300 lm
<b>Colour temperature</b>	3500-7000 K, white light
<b>Colour rendering index</b>	≥ 75
<b>Lumen maintenance at 2,000 hours</b>	The average relative light output of six samples ≥ 90% of initial light output at 2,000 hrs with only one sample allowed to fall below 85% OR; All six samples maintain ≥ 95% of initial light output at 1,000 hrs.
<b>Illuminance</b>	≥ 40 lux at one meter
<b>Total lighting service per solar day</b>	Adequate for minimum 500 lm-hrs

PV-panel requirements	
Minimum output rating	≥ 2.5 Wp
PV-panel overall quality and performance	PV-panels should preferably be free of lead & cadmium. PV-panels should have a strong plastic frame. Refer to the material composition requirements above under the section of General Requirements. PV-panels must be able to charge the battery even if the product is in a disabled state.
Recharge time at 1,000 w/m <sup>2</sup> and 25°C (fully discharged)	Full Charge from 0 to 100% in ≤ 6 hours Partial Charge from 50 to 100% in ≤ 3 hours
Cables, connectors, housing, and other parts	
Cables	Minimum two-meters cable length (Solar Panel to Battery Charging Cable) Minimum 0.5 meters mobile charging cable length with multiple jacks (Optional - based on requirements)
Switch, gooseneck, moving parts, and connector durability	Mechanisms are expected to be used regularly. The product and any included appliances are functional after 2000 cycles (Verasol 2018b).
Certification and Quality Assurance	
Certification and Quality Assurance	<p>The multipurpose solar lantern must satisfy the requirements of the Verasol standard for Pico PV systems. It must be certified by Lighting Global or by any other recognized International Certification Body where the product has been tested at equivalent technical standards to the ones mentioned in IEC TS 62257-9-5 &amp; 8. In the absence of a certification, it has been independently tested against equivalent standards to demonstrate compliance with these technical specifications by an ISO 17095 accredited test laboratory to conduct testing according to IEC TS 62257-9-5 &amp; 8.</p> <p>The devices must be compliant with electrical safety standards and be certified accordingly (e.g. CE, RoHS, VDE, UL).</p> <p>Periodic re-certification: Implement a periodic re-certification process to ensure ongoing compliance with the latest standards and technological advancements.</p>
Repairability Standards	
<b>To ensure ease of maintenance and extended lifespan, the following repairability standards must be met:</b>	
Disassembly and Reassembly	<ul style="list-style-type: none"> <li>Ease of Access: The design should allow for easy opening and access to internal components without causing damage.</li> <li>Tools Requirements: Only standard, commonly available tools should be needed for disassembly and reassembly.</li> <li>Fasteners Use of standardized fasteners that are easy to remove and replace.</li> </ul>
Component Modularity	<ul style="list-style-type: none"> <li>Modular Design: Components should be designed for easy replacement without affecting other parts of the lantern.</li> <li>Standard Components: Utilize standard, off-the-shelf components where possible to simplify repairs and sourcing of parts.</li> </ul>
Repair Documentation	<ul style="list-style-type: none"> <li>Availability of Manuals: Comprehensive repair manuals should be provided, detailing the steps for common repairs.</li> <li>Guidance (Videos/ Step-by-Step Instructions): Instructional videos and step-by-step pictorial guides should be available to assist users in performing repairs.</li> </ul>
Consumer information	
User manual	The user manual must present instructions for the installation, use, and troubleshooting of the system. The user manual must be written in all official UN languages, in natural black ink, on recycled, unbleached paper. Pictograms are preferred to reduce paper usage.
Instructions on the end-of-life of the product	Instructions or guidelines with graphics (pictograms) should be provided, without additional cost, to help consumers to maintain, repair, recycle and dispose of at the end-of-life of the solar lantern, best if it is with online tutorials.
Minimum warranty of kit	Two years

### Branding details

Branding markings should be optional and subject to UNHCR's request. When applicable, the UNHCR logo can be placed on the case. The logo sizes will depend on the solar lantern model, and final design needs to be approved by UNHCR before production.

### Primary packaging

Reducing plastic waste in the environment: all single-use plastic must be removed from packaging (wherever applicable). Each multipurpose solar lantern kit should be placed in a natural-colored carton box made of recycled paper.

### Secondary packaging

An optimal number of products should be packed in export-quality secondary packaging, preferably using sustainable material with its natural color - plastic packaging is forbidden. In case cardboard is used, it must be unbleached, unlaminated, and made from recycled wastepaper. Ink must be non-toxic and ecologically friendly. Innovative solutions are welcome.

Preference will be given to innovative packaging that protects the product during transport, handling and storage, ideally with a second-life purpose, and minimizes packaging waste.

The user-friendliness and safety aspects of handling persons should be considered in the packaging design.

### Tertiary packaging

Secondary packaging might be packed on a pallet; in this case, they need to be wrapped in a water-tight material, preferably made of or containing sustainable material, e.g. recycled plastic or reusable material (such as tarpaulins) or other alternatives. Packaging needs to ensure that products are protected from any damage, including water, dust, and moisture. Innovative sustainable solutions are welcome. Avoid compostable plastics for packaging and increase recycled content wherever possible.

All the plastic packaging materials (wrapping film), straps (if any), others must contain a proper recycling code, which specifies the type of plastic used. Use recycling codes as per ASTM International Resin Identification Coding System (RIC)<sup>5</sup>.

In order to avoid pallets slippage during transportation and possible damage to the carton boxes and their contents, the boxes should be piled to best fit the pallet, e.g. cartons should fit perpendicularly to the edge of the palette and not hang over it or not reach it (edge of the pallet).

#### CRI (UNHCR) Pallets

- Dimensions (L x W x H): 1150 mm (+1 cm / -3 cm tolerance) x 770 mm (+/- 1 cm tolerance) x 144 mm.
- One way pallet.
- Heat treatment according to ISPM 15.
- The relevant acceptable standard is: Grade A Stringer Pallets or 9 Block Pallets.
- For more information, please refer to the Pallet guidelines.

### Optimal shipping / Container information

In preparing shipping, the maximum number of items that can fit into a transport unit must be considered. The container layout plan will be defined on the purchase order.

- 20' DC container (without pallets)
- 40' DC container (without pallets)
- 40' HC container (without pallets)
- 20' DC container (with pallets)
- 40' DC container (with pallets)
- 40' HC container (with pallets)

The final number of the transport unit and maximum height of loaded pallet, if palletized, will be defined on the purchase order.

### Manufactured marking

The solar lantern should include the following data:

- A serial number assuring traceability of the date of manufacture. The date of manufacture shall be reported with a precision of at least the month, year, and batch number. If components are packed separately, each component shall carry these component-specific markings.
- Material composition (type of material(s)) and the ratio of each material in the product.
- Certified sustainability claim/eco-labelling information.
- Information related to the reuse/recyclability of the item.
- Manufacturer name.
- UNHCR Logo (Where applicable).

No company logo should be included with the manufacturer's marking. A sustainability claim can be added, but it must be proven accurate. The final design of manufacturer marking needs to be approved by UNHCR before production.

### Marking on the secondary packaging

UNHCR logo (when applicable) + Solar lantern kit, number of pieces + PO number. No logo of the supplier is allowed. No logo of the supplier is allowed.

The marking must remain readable and well fixed on the secondary packaging after a minimum of ten handlings. Other markings as specified in the contract/purchase order. The UNHCR visibility logo will need to be applied on five sides of the secondary packaging (excluding the bottom).

### Marking techniques

- Laser engraving
- Printing with water-based ink
- Printing on sustainable sticky tapes

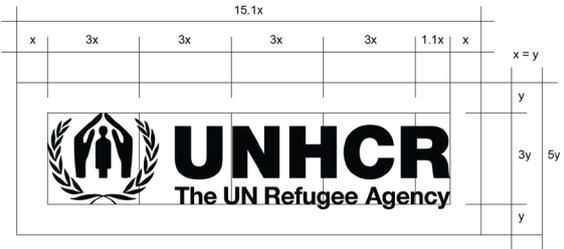
Ink/colouring must be non-toxic and ecologically friendly.

<sup>5</sup> [https://www.astm.org/d7611\\_d7611m-21.html](https://www.astm.org/d7611_d7611m-21.html)

**UNHCR Logo Application Reference**



UNHCR Vertical Visibility logo

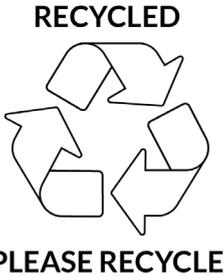


UNHCR Horizontal Visibility logo

**Logo and Shipping Markings on Individual Boxes**

The front and back of the packaging (the largest surface sides of the carton) should include only the UNHCR visibility vertical logo. The two other opposite sides should include the UNHCR visibility vertical logo with the shipping marking information area (below the logo). The top side should include the horizontal visibility logo in one of the closures and the content list in the other closure.

Every box made of recycled paper must have a symbol about its recycled nature and the possibility to be recycled (see Graphic 1):



Graphic 1: Recycled Paper Symbol



**Logo and Shipping Marking on Individual Boxes**

Logo and Shipping Marking for Multipurpose Solar Lantern



Graphic 2

**A. Application of the logo and marking for the front and back sides of the secondary packaging:**

On the front and back sides of the Secondary Packaging, the vertical logo must be placed centrally, occupying a minimum of 60% surface space without any image distortion (as per Graphic 2). Visibility logo in one of the closures and the content list in the other closure. Every box made of recycled paper must have a symbol about its recycled nature and the possibility to be recycled (see Graphic 1):

**Technical Drawing**

Top



A

A

Left



Front



Right



Back



Bottom



**Logo and Shipping Marking on Individual Boxes**

**B. Application of the logo in the 2 other opposite sides of the Secondary Packaging:**

On the two other opposite sides of individual packaging, the vertical logo and shipment information are to be placed centrally, occupying a minimum of 60% surface space (45% for the UNHCR visibility logo and 15% for the shipment information) without any image distortion.

Important: In order to respect the integrity of the logo, the shipment information area should be visually separated from the lower part of the UNHCR visibility logo and framed with the same indelible ink as the detailed information as per Graphic 2.

The information to be placed on the secondary packaging typically include:

- UNHCR Item name and number:
- PO No.:
- PO Quantity:
- Consignor (supplier/manufacturer):
- Consignee:
- Destination:
- Packing units: {number / total number} - To be marked with consecutive numbers shown over the total number of packing units comprising the consignment (N/N: i.e 1/20, 19/20)

This graphical reference of the shipping marks is given as an example only. Shipping marks can be printed on a non-plastic and non-laminated sticker paper and placed on the carton box. The marks shall include the specified information as detailed in the "Shipping Marks" section of the relevant Goods PO.



**Technical Drawing**



Logo and Shipping Marking on Individual Boxes

C. Application of the logo and marking on the top side of the secondary package:

On the top side of the secondary packaging for kitchen sets, the UNHCR horizontal logo is to be placed centrally in one of the closures, occupying a minimum of 60% surface space and without any image distortions. The complete content list of the kitchen set should be included in the other closure. Please see the graphic below.



Technical Drawing

Top



Left



Front



Right



Back



Bottom

