LIGHTING GLOBAL
Catalyzing markets for modern off-grid energy
AN INNOVATION OF WORLD BANK GROUP
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TECHNICAL NOTES

Procurement of Stand-alone Solar Kits for Humanitarian Aid

This Technical Note provides guidance on procuring pico-solar and solar home system (SHS) kits for humanitarian aid. It presents the relevance of the Lighting Global Quality Standards, key procurement considerations, and a step-by-step procurement guide.

Introduction

By procuring large quantities of pico-solar products and Solar Home System kits (collectively referred to as "off-grid energy kits") aid organizations have a considerable influence on the markets for these products. Users of bulk-procured off-grid energy kits generally do not have the option to select the devices purchased on their behalf. Aid organizations, therefore, have a responsibility to procure high quality products that meet the needs of their programs' beneficiaries. By procuring products that meet Lighting Global Quality Standards, aid organizations can have confidence in the quality and performance of the off-grid energy kits they are providing, and they also receive ancillary benefits such as strengthened tenders, increased product selection, and simplified bid evaluation.

Lighting Global Quality Standards

Lighting Global maintains two sets of Quality Standards, one for pico-solar products (off-grid products with peak power ratings of 10 W or less) and one for Solar Home System (SHS) kits (off-grid products with peak power ratings greater than 10 W and up to 350 W). The Quality Standards are benchmarks that set a baseline level of quality, durability, and truth-in-advertising to protect consumers. The Standards are non-prescriptive and technology neutral, which supports innovation as well as diversity of design and function.

To assure procurement of high quality off-grid energy kits, aid organizations are encouraged to select only products that meet the Lighting Global Quality Standards. For products to meet the Quality Standards, manufacturers voluntarily submit their products for testing according to the Quality Test Method (QTM), as specified in International Electrotechnical Commission (IEC) Technical Specification 62257-9-5. Testing is conducted at third-party, accredited test laboratories using randomly procured product samples. The official test results are assessed by Lighting Global to determine if the product meets the Quality Standards. All products that meet the Quality Standards are listed on the Lighting Global website. A summary of the test results for each quality-verified product is available on the website in the form of a Standardized Specifications Sheet. A Verification Letter for each product is also available on the website, which can be used to validate that a product meets the Quality Standards.

Lighting Global quality verification ensures:
Accuracy and truthfulness of consumer-facing information, including light output, run time, battery capacity and PV module power rating.
Maintenance of light output over the product lifetime. After 2000 hours of constant use, lights in pico-solar products must maintain at least 85% of the original luminous flux; lights in SHS kits must maintain at least 90% of the original luminous flux.
Battery durability and protection. A charge controller is required to protect the battery from overcharge and deep discharge. Batteries must maintain storage capacity after extended periods at a discharged state.
Health and Safety. Batteries may not contain mercury or cadmium.[1] Products do not pose safety risks to users.
Product durability and quality. Products must be well-crafted and of robust construction to prevent premature failure.
Consumer-facing warranty. Pico-solar: At least one year of coverage for the system. SHS kit: At least two years of coverage for the system and at least one year for included appliances.
Availability of consumer-facing information. Pico-solar: Solar run time and brightness reported on packaging along with a note about the impact of auxiliary appliance use, such as mobile phone charging. SHS kit: PV module power must be reported on packaging. Product must include a detailed user manual, as well as component specifications and replacement methods.

Why procure Lighting Global quality-verified products?

- Consumer protection: In commercial markets, consumers have the chance to compare and then choose products. Humanitarian aid agencies, however, are typically responsible for identifying and distributing the products. By procuring Lighting Global quality-verified products, aid agencies can have confidence that high-quality energy systems are being provided to the users.

- Easy and reliable comparison among products: Lighting Global Specifications Sheets are available for each quality-verified product and they provide a trusted, third-party resource for a direct comparison of the performance of products. Moreover, product options can be easily researched via Lighting Global's database of products that have been tested at accredited laboratories and meet the Standards.

- Reduced spending: Aid agencies who procure Lighting Global quality-verified products save on budget expenditure. Since Lighting Global quality-verified products undergo thorough testing, there is no need for retesting to verify quality, durability, and truth-in-advertising. Moreover, procurement of Lighting Global quality-verified products reduces risk for aid agencies, as they have the confidence that they are investing in high-quality, durable equipment.

- Reduced market distortion: With relief aid attempting to transition toward development, it is imperative to take into consideration how interventions impact markets and how they may cause aid dependency. Deployment of cheaper, poor-quality products can undermine consumer confidence, resulting in market spoilage. A negative first impression of stand-alone solar products can irreparably damage the market for high quality pico-solar products and SHS kits. In the humanitarian aid context, products are often resold inside and outside the camps or the distribution areas. The influx of poor-quality products (usually at lower-than-market prices) negatively distorts the entire market.

- Competitiveness of the tender: Lighting Global has established the world's most widely recognized quality assurance framework for pico-solar products and SHS kits. The Program has tested hundreds of off-grid solar products and supports the sale of millions of quality-verified products. The expansive and diverse selection of quality-verified products from a large number of manufacturers ensures a competitive tender. Quality-verified products are listed on the Products page of Lighting Global's website.

- Access to technical expertise: The Lighting Global Quality Assurance team provides support to aid

[1] For more information on battery toxicity, and the potential to address these hazards through product design, proper disposal and recycling, refer to the Lighting Global Tech Note on battery toxicity and eco product design.

organizations, helping them to better understand what is needed for specific situations and how to develop appropriate technical requirements.

- Adherence to international frameworks: By procuring quality-verified products, organizations align themselves with existing efforts in the energy access space. The Lighting Global Quality Assurance framework uses internationally accepted test methods and quality standards. The Global Plan of Action for Sustainable Energy Solutions in Situations of Displacement calls for the development of tighter relationships between aid organizations and technical specialists like Lighting Global. The Plan of Action also advocates for improved consumer protection, which can be achieved by referencing the Lighting Global Quality Assurance framework.

Procurement guidelines

While we encourage aid organizations to include Lighting Global quality verification as a baseline technical requirement when procuring products, we are aware that humanitarian aid situations often have specific needs above and beyond the Quality Standards.

Some important considerations for aid organizations when procuring off-grid energy kits include:

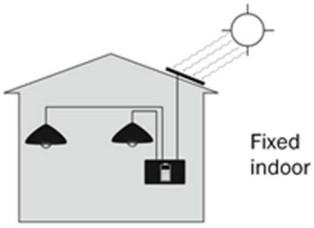
- Durability
- Portability
- Ease of use
- Lighting run time, brightness and distribution
- Mobile phone charging and included appliances
- Potential for product theft
- Product and packaging size
- Distributor responsiveness

These considerations and their relation to the Lighting Global Quality Standards are discussed in detail below. A step-by-step guide for procurement is provided at the end of this document along with a sample technical specification for procuring off-grid energy kits.

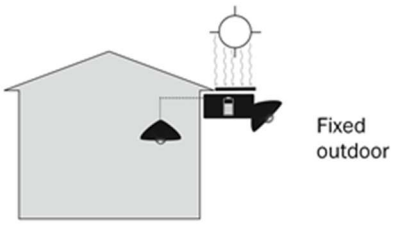
Product Form Factors

As defined by the International Electrotechnical Commission (IEC) Technical Specification 62257-9-5, there are **four basic types of off-grid energy kit configurations**:

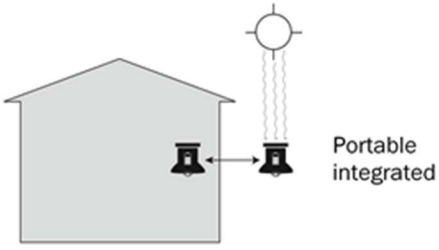
- **Fixed indoor (fixed separate)** – products that are not inherently portable and are intended for indoor use.



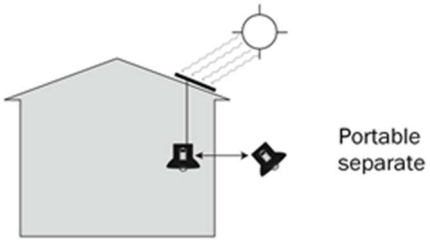
- **Fixed outdoor (fixed integrated)** – products that are not inherently portable and are charged with an integrated solar module or designed to be left outdoors to charge.



- **Portable integrated** – products that are portable and charged with an integrated (inbuilt) solar module or designed to be left outdoors to charge.



- **Portable separate** – products that are portable and charged with a solar module with a cable of at least 3 m, which allows the light point and battery to remain indoors while the product is charging.



Lighting portability

Product designs can be comprised of one or more of the form factors illustrated above, resulting in configurations that are suited for a wide range of applications. When selecting which configurations are most suitable for a particular setting and users' needs, procuring organizations should consider product portability. In some aid contexts, a portable flashlight or torch may be very important to users, while other settings may require fixed indoor systems due to the risk of product loss and/or theft.

Physical Durability

The Quality Standards set physical durability requirements for each type of product form factor. Individual system components such as solar modules and cables must also meet specific durability requirements. By procuring Lighting Global quality-verified products, aid organizations can be assured that the products are appropriately designed to withstand the wear and tear of normal use. The physical durability requirements are summarized below.[2]

Metric	Product / Component Type	Requirement
Physical Ingress Protection	Fixed Outdoor Components	IP5x
	All PV Modules	IP3x or IP2x with circuit protection
	All Other Components	IP2x
Water Ingress Protection	Fixed Outdoor Components	Protected for permanent outdoor exposure
	PV Modules	Protected for outdoor rooftop installation
	Portable Integrated Components	Protected for exposure to frequent rain
	Portable Separate Components	Protected for exposure to occasional rain
	Fixed Indoor Components	No requirement
Moving Parts and Connector Durability	Mechanisms Expected to be Used Regularly	Functional after 1000 cycles
	Mechanisms Expected to be Used During Installation	Functional after 100 cycles
Cable Strain Relief	Permanently Attached Cables	Pass strain relief test
Drop Test	Portable Lighting Components	Drop 6 times from height of 1 meter
	Non-Lighting Portable Components	Drop 2 times from height of 1 meter
	Fixed Components	No requirement
Cable Specifications	Outdoor cables included with SHS kits	Outdoor-rated and UV resistant

Battery Chemistry

The battery is often the component in off-grid energy kits that is most prone to failure. A properly selected, high quality battery that is protected from over-charging and discharging increases the likelihood of a product's reliable performance and long service life. Four **main types of batteries** (or battery chemistries) are typically used in the systems: lithium-ion, lithium iron phosphate, nickel metal-hydride, and sealed lead acid batteries.

- **Lithium-ion (Li-ion) batteries** offer a number of advantages over other types of batteries used in off-grid energy kits, including higher energy density (smaller size) and longer cycle life. Most types of lithium-ion batteries, however, can potentially present a safety hazard if overcharged, overheated, or short-circuited. Venting of electrolyte, catching fire or explosion are possible consequences. To ensure this does not occur, the product must have appropriate built-in protection circuitry.[3]

- **Lithium Iron Phosphate (LiFePO4) batteries** are a type of lithium battery that has become very common in off-grid energy kits for two main reasons. Typically, they offer a longer lifetime than most other lithium chemistries and present a much more stable

[2] Refer to the Quality Standards for Pico-solar Products and SHS kits for detailed information about physical durability requirements.
[3] For more information on lithium-ion batteries refer to the Lighting Global Technical Note on Lithium-ion Batteries

chemistry, which greatly reduces the dangers associated with fire and explosion.

- **Nickel metal-hydride (NiMH) batteries** were quite common in off-grid energy kits until the more recent emergence of lithium batteries. NiMH batteries are reasonably durable and, unlike some other battery types, they do not contain toxic materials such as cadmium and lead. The main disadvantages of NiMH batteries are that they suffer from a relatively high self-discharge rate when not being used and experience a memory effect whereby they gradually lose their energy storage capacity if they are repeatedly recharged after being only partially discharged.

- **Sealed lead acid (SLA) batteries** are an established technology and are relatively inexpensive compared to lithium and NiMH batteries. As such, they tend to be used in products that require greater energy storage capacity. Compared to other common battery chemistries, SLA batteries have a relatively low specific energy (amount of energy stored per unit mass). Products that use SLA batteries, therefore, tend to be significantly heavier than products that use other battery types. Another notable disadvantage of SLA batteries is that they experience relatively rapid self-discharge, and can be permanently damaged if stored in a discharged state. This self-discharge can occur during shipping and warehousing and while products are sitting on store shelves. If care is not taken to limit a product's time in the supply chain, the battery may suffer permanent capacity loss by the time the product reaches the end-user. This damage results in decreased run time or, in severe cases, an unusable product.[4]

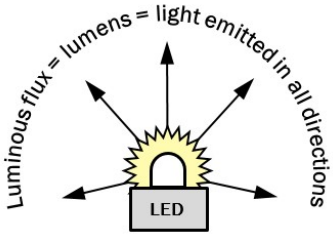
Regardless of the battery technology used in off-grid energy kits, **it is extremely important that batteries be protected from being overcharged and over-discharged**. Exceeding a battery's charge/discharge limits can be dangerous, while also reducing the capacity and lifetime of the battery. Products that meet the Quality Standards have batteries that are durable and protected by a charge/discharge control circuit. Tests are conducted to verify that appropriate deep discharge and overcharge protection are employed in all quality-verified products. Additionally, a battery storage durability test is conducted to accelerate the ageing mechanisms occurring during storage and use.

Aid organizations may have additional durability requirements for products likely to be exposed to extreme environmental or use conditions. Where this is the case, labs in the Lighting Global network may test to these additional durability requirements upon request.

Lighting Characteristics and Performance

Lighting is often the primary application of off-grid energy kits. To set appropriate technical requirements and select suitable products, aid organizations should have a general understanding of some basic lighting principles. Three types of photometric measurements commonly addressed when setting technical requirements for light sources are **luminous flux, illuminance**, and **correlated color temperature (CCT)**. When developing technical requirements and selecting off-grid energy kits, aid organizations should also take into consideration user expectations and system-level performance measurements, such as solar run time and total lighting service. This section provides a brief explanation of these key photometric and system-level concepts.[5]

Luminous Flux



Lighting Global's primary metric for comparing the light output among products is luminous flux. Luminous flux, measured in lumens (lm), is a measure of the total light output of a light source in all directions.

To meet the Quality Standards, a product's advertised lumen output specifications must be accurate. Lighting

[4] For more information on SLA batteries refer to the Lighting Global Technical Note on Shipping and Storage of Sealed Lead-Acid Batteries

[5] For more technical details on these lighting concepts, please refer to the Lighting Global Technical Note on Light Emitting Diode (LED) Lighting Basics.

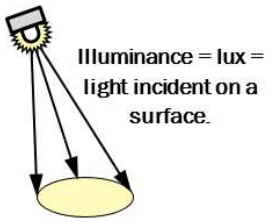
Global Specifications Sheets include the measured luminous flux. Some products have multiple brightness settings and the lumen output for two or more settings are often listed in the product's Specs Sheet.

For reference, lumen output values for some common light sources are provided below in Figure 1.

Lumen output examples	
Standard candle	= 12 lumens
Kerosene wick lantern	= 8 - 40 lumens
Pressurized kerosene lamp	= 330 – 1000 lumens
60 watt GLS incandescent	= 900 lumens
23 watt compact fluorescent	= 1000 lumens

Figure 1. Lumen output values for common light sources.

Illuminance



Illuminance is the amount of light incident on a surface, measured in lumens per square meter (lm/m^2), the unit of which is lux ($1\ lm/m^2 = 1$ lux). This measurement is dependent on a number of factors including the product's lumen output, the measurement distance, and the distribution of light from the product's optics. For example, a torch usually has a narrow focus and is good for lighting a small area (such as a book), while an omnidirectional bulb (emitting light in all directions) is good for lighting large areas such as an entire room. These factors present a degree of complexity when attempting to compare products using lux values. For this reason, the Specifications Sheets do not report illuminance measurements. Instead, Lighting Global provides a characterization of the type of light distribution offered by the light source (narrow, wide or omnidirectional).[6]

Correlated color temperature

Correlated color temperature (CCT) describes how the color of light appears from a light source and is measured in Kelvins (K). The higher the CCT, the cooler and bluer a light source will appear to the human eye; the lower the CCT, the warmer the light will appear (Figure 2). In residential and commercial applications, lighting designers select color temperatures based on the mood or atmosphere they wish to set. In an off-grid environment, color temperature is typically a secondary concern to the light's lumen output and runtime. Some products, though not all, with high color temperatures (>6000 K) may seem uncomfortably 'blue' and will generally have a poor color rendering index (CRI)[7]. While these products will still produce useful light, they may not provide their users with the quality of light available from other similar products. Many off-grid LED products have a CCT near 4000K.

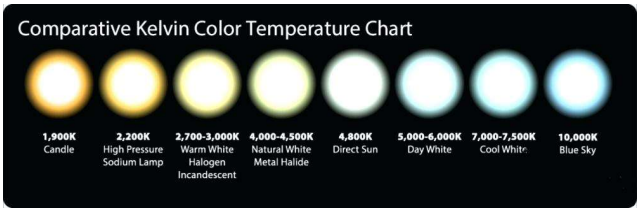


Figure 2. Correlated color temperature light examples.

Off-grid lighting expectations

Field studies of off-grid lighting consumer preferences were carried out by Lighting Africa and Lighting Asia to determine the lumen output of an omnidirectional source that meets users' expectations. In the studies, focus group participants were asked to indicate the minimum satisfactory level of light for room/ambient lighting. The results show that **25 lumens meets the majority of focus group participants' *minimum* expectations for ambient lighting**. Light output below this level will likely only be acceptable for products that also include a higher lumen output setting (many products have multiple output settings; e.g. low/medium/high). It should be noted,

[6] Note that some older product Specs Sheets may report the total surface area (m^2) that a product can light with an illumination > 50 lux. Lighting Global no longer requires this measurement, so it is not reported on newer Spec Sheets.

[7] Color rendering index (CRI) is the quantitative measure of the ability of a light source to reveal the colors of an object faithfully in comparison with an ideal or natural light source. Light sources with a CRI of 85 to 90 are considered good at color rendering.

however, that low output settings will typically have much longer run times. One hundred (100) or more lumens will provide much better lighting service for a room (or large tent) but this comes at the expense of higher cost and/or reduced run time. **Appropriate lighting service, therefore, becomes a balance between higher light output and longer run times.** This information can be assessed and compared between products using Lighting Global Specifications Sheets.

Solar run time and total lighting service

As part of testing according to IEC TS 62257-9-5, laboratories measure products' **solar run time**, which is the duration (hours) of lighting provided by one full day of solar charging.[8] The solar run time for all quality-verified products is reported on their Standardized Specifications Sheets. Results from Lighting Global's research in Africa and Asia show that consumers typically use off-grid lighting products from 4 to 6 hours a day.

Products' **total lighting service** is also measured during laboratory testing. Total lighting service, measured in lumen-hours (lm-hr) per solar day, indicates the total amount of light the product can produce when charged over a solar day. Take, for example, a product that can produce 100 lumens of light for a period of 10 hours after a day of solar charging. This products provides a total lighting service of 1000 lm-h per solar day.

The United Nation's Sustainable Energy for All (SEforALL) initiative has established Energy Access Tiers that define five levels of energy access, from Tier 0 (no access) to Tier 5 (the highest level of access). To achieve each tier of energy access, a minimum level of energy service must be met, which is quantified according to capacity, duration, reliability, affordability, legality, health and safety. As an example, an aid organization may wish to provide Tier 1 energy access to its program beneficiaries. To achieve Tier 1 energy access for a household of five, a product or combination of products that can provide 1000 lm-h of lighting service and 3 watt-hours of mobile phone charging capacity per day is required.

For reference, solar run time and total lighting service figures of Lighting Global quality-verified products as of June 2018 are provided in Figure 3.

Light Global quality-verified products

Solar run time on the product's highest setting
range = 2 to 29 hours
average = 6.5 hours
median = 5.5 hours

Total lighting service
range = 85 to 79800 lm-h
average = 2360 lm-h
median = 890 lm-h

Figure 3. Lighting Global quality-verified product figures as of June 2018.

Mobile Phone Charging and Included Appliances

Mobile communications are critical in many aid contexts, and many off-grid energy products (both pico-solar and SHS kits) are capable of charging mobile phones. Lighting Global's online product database and Standardized Specification Sheets indicate if a product can charge mobile phones. When assessing products that are capable of mobile phone charging, organizations should take into account the following:

- Mobile phone charging via an off-grid energy kit draws energy from the kit's battery that could otherwise be allocated to other services, such as lighting. When users charge mobile phones, they are reducing the total lighting service that can be provided by the off-grid energy kit.
- Smart phone charging generally draws more energy from the system, as compared to basic mobile phone charging.
- Not all off-grid energy kits are capable of charging all smartphone makes and models.

Solar home system (SHS) kits – off-grid products with peak power ratings greater than 10 W and up to 350 W – are generally capable of charging mobile phones, and often include appliances such as radios, televisions and fans. Standardized Specifications Sheets for SHS kits

[8] The solar run time measurement is concluded when the light source reaches 70% of the initial output. The standard solar charging day is defined as an incident solar resource of 5 kWh/m^2.

provide important performance details, including the solar run time of each appliance when used alone, as well as the solar run time of all included appliances when used in combination. These individual and combined performance data are indispensable for organizations that need to assess and compare the energy services provided by SHS kits.

Ease of Use

The Lighting Global Quality Standards for SHS kits require that a detailed user manual be provided with the product, which includes instructions for installation, use and troubleshooting of the system. The Quality Standards for pico-solar products, however, do not contain specific user manual or ease-of-use requirements. Some aid organizations may wish to take into account the following considerations when procuring off-grid energy kits:

- Consider evaluating the product's ease of use by obtaining a sample from the vendor. The sample should include a copy of the product's instruction manual, preferably written in an appropriate local language, for evaluation.

- Consider requiring that products include system status indicators that provide information about parameters such as battery state of charge, when the battery is being charged and/or when the charge is complete.

- It may be useful in some contexts for the product to charge not only from the PV module, but also from standard AC electrical outlets.

Product Size, Weight and Packaging

The Lighting Global Quality Standards do not contain requirements for the physical size of products or packaging. Aid organizations that may wish to include such requirements in their procurement should consider the following:

- If the off-grid energy kit is likely to be packaged together with other relief items for distribution, it may be useful to consider how these items will be packaged together. For example, some aid organizations distribute buckets with relief items such as hygiene kits, clothes, kitchen sets, mosquito nets and soap (Figure 4). If the product is to be included in a bucket, it may useful to consider the size of the bucket, the size of the product in its packaging and whether it will fit in the bucket. Many companies may also accommodate aid organizations that request for their logo to be featured on the product and/or packaging.

Figure 4. Distribution of aid materials in buckets

- The size and weight of the product may be relevant if the target beneficiaries are children. A smaller-sized, lighter product may be more appropriate for children.

- Transportation of the products to the destination area is another important consideration. Aid organizations may need to set packaging and delivery requirements to comply with logistical constraints. For example, products may need to be packed in a certain type of carton, or the packaging must be dimensioned for loading onto a particular type of pallet. If packages are being air-lifted and dropped at the destination, results of a package drop test could be requested to ensure the products can be dropped safely. [9] Aid organizations may also request that the product supplier provide information about how many packaged products

[9] Note, Lighting Global conducts a 1 m drop test on portable components, but the test is conducted without the packaging and is intended to simulate dropping the product while carrying it, not in an air-lift scenario.

will be fit in each pallet or shipping container used for transportation.

Product Distributor and Warranty

When procuring off-grid energy kits, aid organizations may wish to consider the following aspects regarding the product supplier and warranty.

- The readiness of the supplier to ship specific product quantities at short notice.
- The location of product warehouses and the shipping time to the relief area.
- Warranty – Products should include an actionable warranty covering manufacturing defects, at a minimum. All Lighting Global quality-verified products carry a consumer-facing warranty. Quality-verified pico-solar products must be warranted by the manufacturer for at least one year, and solar home system kits must be warranted for at least two years. [10] Aid organizations may choose to set additional warranty requirements beyond the Quality Standards.
- Supplier after-sales service offering – The supplier should be able to provide a simple warranty procedure that aid beneficiaries can access relatively easily. If warranties are service-based, spare parts and technical support should be accessible. Beware of procuring products from companies that do not have an established after-sales service structure.
- Installation and maintenance should require minimal effort and knowledge. The product should be designed to be essentially maintenance-free.

Product Security and Theft

In some settings, off-grid energy kits are prone to malicious damage and theft, which can be a concern in the context of humanitarian aid. When selecting products for procurement, aid organizations should consider product security in addition to the aspects that have been addressed above. The ideal selection should strike a balance between fulfilling users' needs, meeting logistical/programmatic requirements, and assuring system longevity. To reduce theft or loss of off-grid energy kits, organizations may choose to procure products designed for fixed installation rather than portable products. Fixed indoor products have the advantage of security, as indoor components can be locked inside lodgings and solar modules can be securely fixed to roofs. In other cases where portable lighting is a priority, aid organizations may choose to procure portable products with integrated solar modules that can be easily transported by the user.

Guidance for Procurement of Quality-verified Standalone Solar Kits

Develop Technical Requirements

In preparing a request for proposals (RFP) or a request for quotes (RFQ) for the procurement of off-grid energy kits, consider the context of the humanitarian crisis or situation and the potential users' needs. Humanitarian crises that result from armed conflict, epidemics, famine, natural disasters and other major emergencies are all characterized by different user needs for lighting and energy services.

While setting requirements above and beyond the Lighting Global Quality Standards may be appropriate in some cases, organizations must exercise caution when establishing prescriptive technical requirements for off-grid energy kits.

- Overly-prescriptive requirements can inadvertently disqualify good-quality products that may be appropriate for the specific application.
- Setting technology-specific requirements (e.g. battery chemistry) may restrict the application of innovative solutions.
- Specialized applications (e.g. health clinics) may demand more stringent performance requirements.

[10] Kits larger than 10 W are required to carry a 2-year warranty on the main system and 1-year warranty on any included appliances.

- If setting technical requirements above and beyond the Lighting Global Quality Standards, make sure that they can be verified using official test reports and Lighting Global Standardized Specifications Sheets so that no additional testing is required.

- Make sure that the technical requirements meet or exceed any applicable standards in the country in which the products are to be deployed.

- The RFP or RFQ should specify in detail all technical requirements that the off-grid energy kits must meet to qualify. A template for product specification options is provided in Appendix A, and a sample procurement specification for an off-grid energy kit is provided in Appendix B.

Check Claims

Once bids are received, check the proposed products against the database of quality-verified products on the Lighting Global website. Confirm that the proposed products are, in fact, quality-verified. Validate that the product specifications provided in the bids match those available on the products' Standardized Specifications Sheets. If more detailed information is needed to validate that the products meet any additional technical requirements, organizations should require that bidders submit official test reports (conducted according to IEC TS 62257-9-5 at an ISO 17025 accredited lab).

Contact Lighting Global

Lighting Global offers one-on-one technical support, and we encourage organizations to contact us early in the process of preparing for the procurement of pico-solar products and/or solar home system kits. The contact email address is bds@lightingglobal.org. In all cases, we encourage you to inform Lighting Global of any future tenders so that we can be prepared to respond to the needs and timelines of product suppliers interested in testing products to qualify for your procurement.

Conclusion

Lighting Global supports the market for off-grid energy kits through product testing and quality verification. Our quality assurance framework is founded on internationally accepted test methods and Quality Standards. By procuring Lighting Global quality-verified products, aid organizations can be confident that they are deploying high quality off-grid energy kits. When determining which quality-verified products are most appropriate for a particular application, aid organizations should consider product durability, performance, mobile phone-charging capabilities, included appliances, ease of use, product and packaging size, distributor responsiveness, and the potential for product loss or theft
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Appendix A – Template Procurement Specification Options for Off-grid Energy Kits

Specification	Details
Current Lighting Global quality-verified product[11]	Specify that the off-grid energy kit must be a current Lighting Global quality-verified product. This guarantees that the product has been tested at an accredited laboratory within the past two years and that it meets the Lighting Global Quality Standards. A copy of the product's Verification Letter can be downloaded from the Lighting Global website, and provided as evidence of quality verification.
Type of product	Specify the type(s) of product required based on the anticipated needs of the users and the context. • Fixed indoor product – Typically used for a secure household or for a fixed installation such as at a clinic or community area. • Fixed outdoor product – Typically used for illuminating an outdoor area, such as for shop fronts or near toilets. • Portable product with a separate solar module – Generally appropriate for areas where separate solar modules can be fixed securely but the light must be portable. • Portable product with an integrated solar module – Generally appropriate for settings where a separate solar module cannot be fixed securely. Additional durability requirements such as ingress protection above the levels required by the Lighting Global Quality Standards may also be included here.
Lighting characteristics	Specify the minimum or range of lighting characteristics required. • Type of lighting provided – ambient lighting, task lighting, or a combination of both • Number of light output settings • Minimum lumen output (lm) • Number of light points • Solar run time (h) • Total lighting service (lm-h) per solar day • Correlated color temperature (K) – or more generally, warm white or cool white lighting
Mobile phone charging	Specify if mobile charging capability is required and request information on the types of connections/phones that can be charged.
Included appliances	Specify which (if any) appliances must be included with the off-grid energy kit. If appliances are included, minimum solar run time requirements should likely be specified when the appliances are used in combination with other energy services (e.g. lighting, mobile phone charging).

[11] Additional requirements (e.g. product type, lighting characteristics, energy services and appliances, etc.) beyond meeting the Quality Standards may not be necessary for all procurements. Setting requirements above and beyond the Quality Standards should be done with discretion, in accordance with the particular setting and application.

Specification	Details
Ease of use	Specify the ease of use requirements. • The language of the product manual and what it should contain (easy to follow photos, pictures, etc.) • A picture of the product and a copy of the product manual to be sent by email • A sample of the product to be couriered to your procurement office within a certain number of days • Installation and maintenance should require minimal effort and knowledge or the product should be maintenance-free • Product indicator lights required – e.g. for battery charging and end of charge • Capability of charging by PV module and AC mains, where appropriate. Note: Very few quality-verified products currently provide this option.
Size and packaging	Specify product size and packaging requirements. • The maximum product size and weight – e.g. if it needs to fit a bucket, or will be predominantly used by children, etc. • The packaging and delivery requirements – e.g. in which type of cartons it should be packed, and upon which type of pallet should be transported.
Distributor and warranty	Specify distributor and warranty requirements. • The delivery time required for a specific quantity from the placement of the order • A statement from the distributor on their capabilities to handle warranty issues in the context of the humanitarian crisis that includes how a user can access the warranty and the process they would need to go through • Additional warranty requirements if the tender exceeds the requirements set in Lighting Global's Quality Standards.

Appendix B – Sample Procurement Specification for an Off-grid Energy Kit

NOTE: The table below provides an example product specification. The specifications listed are not meant to be recommendations from Lighting Global, but they are an example of how a specification may be described.

Specification Category	Minimum Requirements
Current Lighting Global quality-verified product	• The product must be a current Lighting Global quality-verified product. A copy of the product's Verification Letter is required as evidence of quality verification
Type of product	• The product must be a portable product with an integrated (inbuilt) solar module • The product must use a lithium-ion battery
Lighting characteristics	• Number of light points: 1 • Type of lighting provided: ambient lighting (i.e. not task lighting) • Two or more light settings with the brightest setting having a lumen output of at least 60 lm • Warm white color temperature • Solar run time: At least 4 hours on the brightest setting • Total lighting service per solar day: at least 240 lm-h
Mobile phone charging	• Mobile phone charging capability is required – a Nokia basic phone connection must be included
Ease of use	• The product manual should be in English and contain easy to follow instructions in picture form • A picture of the product and a copy of the product manual must be provided via email • A sample of the product must be couriered to us and received within 14 days • Installation and maintenance should require minimal effort and knowledge. The product should be maintenance-free • Product indicator lights are required. At a minimum, indicator lights shall inform users when the battery is being charged and when the battery is fully charged
Size and packaging	• The maximum product dimensions are 31cm X 21cm X 21 cm • The maximum product weight is 3 kg • To be packed in a carton box prominently marked with the entity's logo • Delivery with EUR-pallet
Distributor and warranty	• The selected vendors shall be required to deliver all items in twenty-one (21) calendar days' notice. • A statement must be provided detailing your capability to handle warranty issues in the context of the typhoon relief situation in the Philippines. This must include how users will access the warranty and how the warranty will be executed.