

Pre-Read Document for Webinar on Submission of Lighting Global Quality Standards to the International Electrotechnical Commission (IEC) **Lighting Global Stakeholder Outreach Memo**

February 2018

Since 2010, we have managed the Lighting Global Quality Standards for pico-solar products to protect customers and avoid market spoiling by setting a baseline level of quality, durability, and truth in advertising in the off-grid solar market. In 2015, we introduced the Lighting Global Quality Standards for plug-and-play solar home systems kits, and these standards now cover products with solar modules up to 350 peak watts. After considering conditions in the market, government plans for standards adoption, and stakeholder input, we have determined that the time has come to submit these standards for adoption by the International Electrotechnical Commission (IEC). In the case of the pico-solar standards, we have completed a stakeholder outreach process that indicated strong support within the sector for submitting them to IEC. At the same time, our experience and stakeholder feedback have indicated a need for some modest changes to the standards. We also believe that the quality standards for solar home system kits should be submitted as a stand-alone document, separate from the quality standards for pico-solar products. This memo provides some notes in relation to these topics and decisions. It is intended to serve as a pre-read document for an upcoming stakeholder webinar, which will take place on Thursday, February 15 from 4:00 pm to 6:00 pm CET. See <https://register.gotowebinar.com/register/5857986135700435458> to learn more or register for the webinar.

Background

The Lighting Global Quality Assurance (QA) framework can be divided into two key parts: the quality standards and the test methods. The quality standards describe the pass/fail thresholds for products tested according to the test methods. The test methods have been institutionalized through IEC/TS 62257-9-5, a Technical Specification published by the International Electrotechnical Commission (IEC). In December 2017, the IEC approved Edition 4 of IEC/TS 62257-9-5 by a vote of national committee representatives. This newly revised document contains test methods for both pico-solar products and solar home system kits. We anticipate that Edition 4 of IEC/TS 62257-9-5 will be published in April or May of 2018. The current version of the document (IEC/TS 62257-9-5 Ed. 3) is available through the IEC webstore at this address:

<https://webstore.iec.ch/publication/25275>. Currently, the quality standards are maintained separately by Lighting Global and publicly available here: www.lightingglobal.org/resource/lighting-

[global-quality-standards/](#). In May 2017, Lighting Global initiated a process to [ask for stakeholder feedback](#) regarding submission of the Lighting Global Quality Standards for pico-solar products to the IEC. The outcome of that process, [published on the Lighting Global website in December](#), confirmed that the standards should be submitted. Considering our observations of the activities and interests of government and market actors along with stakeholder discussion at the Global Off-Grid Solar Forum and Expo in Hong Kong, we also think that it makes sense to submit the standards for plug-and-play SHS kits to the IEC.

Meeting the Quality Standards is a requirement for participation in Lighting Global support programs. All products that meet the Quality Standards are issued a Standardized Specifications Sheet and Verification Letter and posted on the [Lighting Global website](#). Recently, additional programs, distributors, and governments have begun to either reference or harmonize with the Lighting Global Quality Standards to ensure product quality for their stakeholders or consumers.

Motivation for Submitting SHS Quality Standards to the IEC

In cases where governments are considering regulating the market for off-grid solar products, Lighting Global has worked with partners from the Lighting Africa and Lighting Asia country program teams to engage with governments to support adoption of harmonized test methods and quality standards. To date, six countries (Kenya, Ethiopia, Tanzania, Rwanda, Afghanistan, and Pakistan) have adopted quality assurance frameworks for pico-solar products that reference IEC/TS 62257-9-5 and/or the Lighting Global Quality Standards. In addition, we are in conversations with multiple additional countries that are considering adoption of quality standards for pico-solar products and SHS kits. Government interest in standards adoption is especially strong for SHS kits, and we anticipate considerable activity in this area over the coming 1 to 2 years.

In our discussions, we have noted that governments are often hesitant to accept quality standards published by a program, such as Lighting Global, while they are accustomed to referencing quality standards and test methods published by the IEC. Submitting the Lighting Global Quality Standards to the IEC would simplify the process for governments to adopt quality standards and enable a widespread, harmonized quality assurance approach. At the recent [Global Off-Grid Solar Forum and Expo](#) in Hong Kong, Lighting Global and GOGLA held a quality assurance stakeholder meeting that included representatives from private sector companies, government standards bureaus, and other relevant stakeholders. The government representatives in attendance confirmed that submission of the standards to IEC would greatly increase the likelihood that they would adopt the standards on a harmonized basis.

The IEC is widely respected as the largest international standards body for electrical appliances and equipment, and governments around the world routinely adopt IEC standards. Additionally, nearly every country in the world is affiliated with the IEC and can therefore provide input on the development and revision of the standards. Private sector firms and other relevant stakeholders can also participate in the IEC process by joining an appropriate working group through their national standards organization. The working group that manages off-grid solar test methods and standards

documents such as IEC/TS 62257-9-5 is Joint Working Group 1 (JWG1) of IEC Technical Committee 82 (TC82: Photovoltaics).

In short, submitting the Lighting Global Quality Standards to the IEC is expected to:

- Increase the stature of the global quality standards and thereby reduce the risk of countries adopting divergent standards;
- Provide a formal process for obtaining input from national governments, private sector companies, and other stakeholders; and
- Enable national governments to easily keep their standards synchronized with the global standards (by referencing the IEC technical specification without referencing a particular edition/version).

Potential Drawbacks to Submitting Quality Standards to the IEC

Although submitting the Quality Standards to the IEC promises to improve the government adoption process, the transition comes with several concerns:

- **Moderately long timeline to update the standards.** IEC documents are typically updated every 2 to 5 years, and the timeline for completing a revision of a document, once the process is initiated, is usually at least one year. As a result, once the Lighting Global Quality Standards have been adopted by IEC the timeline for revising them to stay current with technology and market trends will be longer than it has been in the past. However, now that several governments have adopted national quality standards that are harmonized with the Lighting Global Quality Standards, we have relatively little flexibility to modify standards without going through time-consuming consultation with these governments to ensure that any changes are made jointly on a harmonized basis. In other words, the flexibility to update the standards quickly that we had in the past was lost with government adoption. As a result, we expect little or no additional loss in flexibility following IEC adoption relative to the current situation.
- **Access to standards requires payment:** The Lighting Global Quality Standards are currently available on our website free of charge. Once they are published by IEC, member governments will have access to the documents, but companies and other non-government actors will have to purchase them in order to have access to the documents. We anticipate that the price for buying each document (i.e. the pico-solar standards and the SHS kit standards) will be on the order of USD 100. Note, however, that the price is set by the IEC, and it could vary from this amount.
- **Translation of the standards:** The Lighting Global Quality Standards are [currently available in English, French, and Chinese](#). Documents published by the IEC may be made available in English and French, but IEC does not support Chinese translation. If China adopted the standards through the China National Institute of Standardization (CNIS), they

could translate the document and make it available. However, we have not had discussions with CNIS about this, and we do not know if they would consider adoption.

- **Unequal stakeholder influence.** Some stakeholders, such as governments, organizations, and companies that can afford to send representatives to the IEC meetings, could have a more direct voice in the development of the quality standards. However, those who do not have the resources to send representatives would have more limited influence. Lighting Global or GOGLA – both of whom are represented at IEC TC82 - could play a mitigating role by continuing to gather stakeholder perspectives from a wide audience, but those privileged to be “in the room” may have a stronger voice. In addition, Lighting Global and GOGLA have discussed establishing an ongoing process for collecting suggestions about possible changes to the test methods and standards for off-grid solar products. This will allow stakeholders that are not able to join the IEC committee to submit comments and suggestions as they come up.
- **National standards may still fall out of harmonization.** Over time, if a country’s suggestions are not adopted by IEC, the country may choose to use the IEC standard with modifications. (This is the case for many IEC standards for on-grid lighting and appliances.)
- **Governments not prepared to enforce the standards may adopt.** If submitting the quality standards to the IEC makes the adoption process more straightforward, countries that had not previously considered adopting quality standards, and are not prepared to enforce the standards effectively, may do so.

Timeline for Standards Adoption by IEC

The process for standards adoption by IEC involves multiple steps and several votes by national representatives of IEC member countries. The steps of the process are as follows:

- 1) The process of developing a standard in the IEC system is formally initiated by submitting a New Work Item Proposal (NP) for review and approval. Once the proposal is submitted, there is a 3-month period for review and commenting. At the end of the period, a vote of national committee representatives is held. A majority of the voting representatives must approve the proposal to enable the process to continue.
- 2) Once the NP is approved, the document can be drafted by a designated project leader in collaboration with a project team. The presumptive project leader is Dr. Arne Jacobson of the Schatz Energy Research Center and the Lighting Global Quality Assurance Program. Dr. Jacobson is also Co-Chair of JWG1 of IEC TC82. Because the Lighting Global Quality Standards already exist as a document, the period for drafting the document is expected to be short.
- 3) Once drafted, the document can be submitted to JWG1 for review and acceptance as a committee draft (CD). Our goal is to submit the draft in advance of the next JWG1 meeting, which is scheduled for May 2, 2018. The period of review by the working group can vary depending on the amount of time group members need to review and discuss the document.

- 4) Once JWG1 has completed its initial review, the document is circulated to members of the technical committee (TC82 in this case) through their national bodies for review and comment. The comment period can be set at 2, 3, or 4 months based on the recommendation of the working group in consultation with the technical committee secretary. After the review period, the project leader and team are responsible for responding to comments and submitting a revised version of the document to the working group.
- 5) In the next to the last step, the revised version of the document is made available to national committees for final review and a vote for approval. The period, which is called the Committee Draft for Vote (CDV) stage, involves a 3-month review and voting period. If the CDV outcome is positive and any comments received only involve minor editorial issues, the document can proceed to publication.
- 6) Final publication is managed by the IEC Central Office and typically takes 6 to 8 weeks.

While it is difficult to estimate the exact amount of time required to complete the process, we anticipate that it will take at least 12 months from the time that the New Work Item Proposal is approved until the document is published.

Plans for Revisions to the Pico-PV and Solar Home System Kit Standards Prior to Submission

Based on input and discussions over the past 10 months through multiple types of stakeholder engagement, we have identified areas where changes to the standards are merited. We outlined planned changes to the pico-solar standards in a recent stakeholder engagement document that is available at this link: <https://www.lightingglobal.org/resource/stakeholder-feedback-on-proposal-to-submit-the-quality-standards-to-the-iec/>. As per a request from GOGLA, we are providing additional details about our plans here. The aim is to raise awareness and build consensus of the changes among manufacturers prior to submission to the IEC.

1. We plan to exempt lithium iron phosphate (LiFePO⁴) and lithium ion batteries that carry a valid [IEC 61427-1](#) certificate from the battery durability test during QTM testing. While the tests in IEC 61427 are not identical to the battery durability test in IEC/TS 62257-9-5, the tests do include a rigorous evaluation of battery performance and durability, including a battery cycling test at high temperature, so we believe less durable batteries would be screened out. All batteries would still be subject to the battery durability test during renewal testing and market check testing.

[If the decision is made to also submit the standards for solar home system kits, then this change would be made to those standards as well.]

2. We plan to update the Accelerated Verification Method (AVM) to allow for sampling of pre-production stock and to enable more companies to be eligible to use this pathway. The revised AVM would be similar to the existing version, but the initial test would be a full QTM conducted with manufacturer-supplied samples (which could be pre-production samples). The follow-up test would be a market check test conducted with samples selected from the market or randomly sampled from the warehouse (at the discretion of the program). By flipping the order of the testing,

the minimum stock requirement is reduced or eliminated from the process for eligible companies. Although the cost will vary depending on pricing at selected laboratory and the complexity of the product, we anticipate that the AVM testing route could cost about \$12,000 for a single lamp pico-solar product compared to \$7500 for testing the same product under the conventional QTM testing process. The costs for larger and more complex products would likely be somewhat higher for both the AVM and QTM pathways. As noted above, the eligibility criteria could be revised to allow companies to maintain eligibility even if they have prior failures in QTM testing. As with the current AVM, the company would be responsible for the costs of both the QTM and follow-up MCM tests. The eligibility criteria would be:

- Must have had at least 3 products that have previously been QTM tested and met the Quality Standards
- Must have at least 1 product that currently meets the Quality Standards (has been QTM, AVM or renewal tested in the past 2 years)
- Company has had no Market Check Test or Renewal test failures in the past 2 years

[Thus far, solar home system kits have not been eligible to use the AVM method. Our intention is to have an AVM pathway for solar home system kits in the future, but we are concerned that companies do not yet have sufficient experience with the SHS kit test methods and standards to successfully utilize the AVM pathway. When implemented for SHS kits, the AVM would likely be configured in a way that is similar or identical to the arrangement for pico-solar products.]

3. We plan to discontinue the "limited-stock" option. This option has very rarely been used, and we believe the AVM option should provide the needed flexibility for companies that cannot otherwise meet the minimum stock requirement.

[We plan to discontinue this option for solar home system kits as well.]

4. We plan to implement the changes discussed in a [stakeholder process in 2016 that are dependent on Edition 4 of IEC/TS 62257-9-5 being published](#). These include:

- Adding requirements that apply to products with ports, including requirements for port voltage regulation, PV overvoltage protection, miswiring protection, and circuit and overload protection. These requirements already apply to SHS kits, and they will be extended to pico-solar products with ports through this revision. Note also that we plan to remove the requirement for "dynamic voltage regulation" from both the standards for pico-products and SHS kits.
- Requiring additional battery protection for products with lithium batteries. All lithium-based batteries must carry UN 38.3 certification and have overcharge protection for individual cells or sets of parallel-connected cells.
- Tightening the 2000-hour lumen maintenance threshold from 85% to 90%. The LM-80 alternative test for LED durability will continue to be available.

[For both pico-solar and solar home system kits, we are considering requiring [IEC 62133-2:2017](#) and/or [UL 1642](#) in lieu of UN 38.3. IEC 62133/UL 1642 is used to assess the quality of portable

lithium batteries during use, whereas UN38.3 is focused on battery protection during transportation. Before making this change, we need to conduct some more research regarding whether IEC 62133/UL1642 is commonly referenced and would appreciate any stakeholder feedback on the subject.]

5. After careful consideration, we have decided to maintain the requirement that products be renewal tested every 2 years. As noted in the Stakeholder Feedback Document, we examined the 49 renewal tests conducted between 2012 and 2017 and found that only 29% of products met the requirements without need for correction.¹ With this low of a pass rate, we feel it is imperative that products be retested on a regular basis and that this period not be extended.

[We would maintain the 2-year renewal period for solar home system kits as well.]

6. We are continuing to explore the possibility of allowing PV modules with an IEC 61215 certificate and associated detailed IV curve test data to use these data in lieu of the PV-IV curve test in IEC 62257-9-5. However, despite multiple requests for data from relevant companies, we have only been able to assess two modules that had results from the methods in both IEC 61215 and IEC 62257-9-5 to verify that they are comparable. Test data for additional products would be needed to confirm the comparability of these two methods. We therefore do not plan to include this option in the submitted standards. If sufficient data can be assembled from relevant companies to assess this option within a few months, this option could be included during the IEC review process.

[Any changes related to this issue would be applied to the standards for solar home system kits as well.]

¹ It is worth noting that 43% of the products that did not meet the standards during renewal testing failed due to new requirements that had been introduced since they were originally tested, while 57% failed relative to metrics that were in place when they underwent the original QTM tests.