



Quality Assurance for Off-Grid Lighting Expansion to Cover Solar Home System Kits

Stakeholder Outreach Webinar

17 September 2014

2 PM GMT



Presenting Today



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Agenda

- **Brief background** on Lighting Global QA
- Overview of **plans to cover SHS kits**
- Summary of **stakeholder feedback and resulting revisions to draft Quality Standards**
- **Next Steps:** Pilot testing, research and development of program service offering
- Open for **Questions**

Agenda

Open for
@questions



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- Overview of **plans to cover SHS kits**
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- Open for **Questions**

Lighting Global Quality Assurance Program

- Joint initiative of **IFC and World Bank**; supports Lighting Africa, Lighting Asia and Lighting MENA
- **Testing and verification program** for LED-based off-grid lighting products
- QA framework for pico-products institutionalized through the **International Electrotechnical Commission** (TS 62257-9-5, Ed. 2.0)



Lighting Global Quality Assurance

Key Partners and Organizations

Off-Grid Lighting QA Partners

Test Laboratory Network



We are working to engage additional labs, especially in Asia.

Lighting Global QA Program Highlights

(2009 to 2014)

1

QA framework including test methods actively in use
(and adopted by IEC)

5

active test labs (Kenya, California, New York, Germany,
India) and others in development

120+

products tested under the program

84

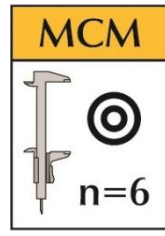
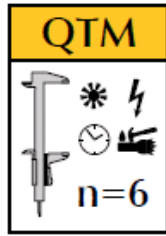
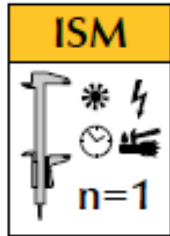
products have met quality standards according to tests

~6 M

quality assured lights sold in Africa as of July 2014
(sales in Asia also significant)



Lighting Global QA Program Elements



Standardized Testing Methodologies

QTM = quality test method

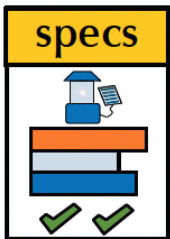
ISM = initial screening method

MCM = market check method



Minimum Quality and Durability Standards

Metrics and thresholds for ensuring truth-in-advertising and minimum product quality and durability

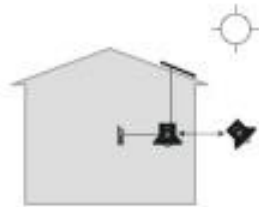


Standardized Specification Sheets

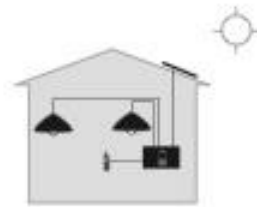
Standardized framework for reporting verified performance for products that meet minimum quality standards; available at www.lightingglobal.org/products

Electricity Access Continuum

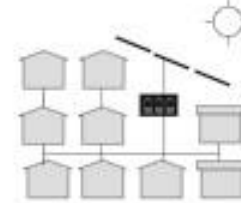
Pico-powered Lighting Sys.



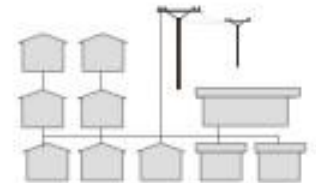
Solar Home System



Micro / Mini-Grid



Regional Grid



Scale (~Watts)

1 – 10's

10's – 100's

100's – 1000's

$10^6 - 10^{11}$

Topology

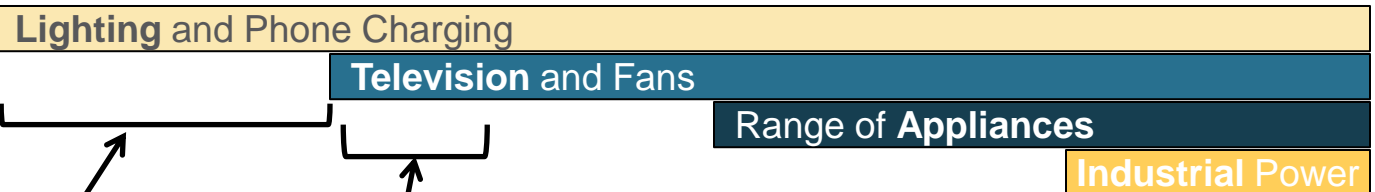
DC Only

DC – some AC

Mostly AC

Nearly all AC

Loads



Lighting Global currently covers this range of pico-products

Lighting Global is in the process of expanding to cover **plug-and-play solar home system kits**, initially up to 100 Wp

Why expand to solar home system kits?

Solar module, LED and battery prices dropping

+

Appliance efficiency improving

+

Demand for solar products growing

Systems with more utility are becoming affordable

and available



www.elim-energy.com



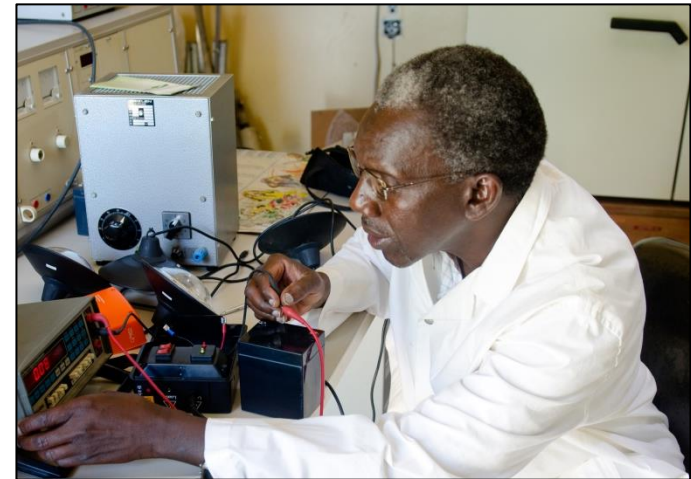
www.andslite.com



www.omnivoltaic.com

Why expand to solar home system kits?

- Manufacturers and other industry stakeholders have requested quality assurance testing for SHS kits to help build credibility for financing & bulk sales
- Lighting Africa, Lighting Asia, Lighting MENA, and US DOE / Global LEAP are interested to support the development of commercial markets for affordable, quality assured SHS kits
- There are existing standards that cover solar home system components, but few that assess products at the system level
- System level QA testing can be less costly than a component-based approach



What is Lighting Global's planned approach?

- Develop quality standards and test methods with initial focus on DC kits up to and including 100 Wp
- Develop methods using existing IEC standards and TS 62257-9-5 as a starting point; draw from other existing methods wherever possible
- Plan to submit test methods formally through IEC process (~June 2015), but will first:
 - Get feedback: Provide stakeholders an opportunity to review and comment on drafts
 - Pilot methods: Utilize draft methods on trial basis and revise as needed
- Simultaneously work with the Lighting Africa and Lighting Asia programs to develop appropriate support and service offerings for this new sector



Planned approach:

- Develop quality standards and test methods with initial focus on DC kits up to and including 100 Wp
- Develop methods using TS 62257-9-5 and other relevant IEC documents as a starting point; draw from other existing methods wherever possible
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Open for
@questions



Stakeholder Process



- Released a set of draft Quality Standards for solar home system kits and requested comments (July 21 to August 11)
- Compiled comments and provided responses, along with a revised set of Quality Standards in a Stakeholder Feedback Document
- Following this webinar, plan to continue to engage with stakeholders as we finalize the Test Methods, Quality Standards and Program Service Offerings over the next year. Updates will be posted regularly on the Lighting Global website: www.lightingglobal.org/activities/qa/stakeholder-engagement/

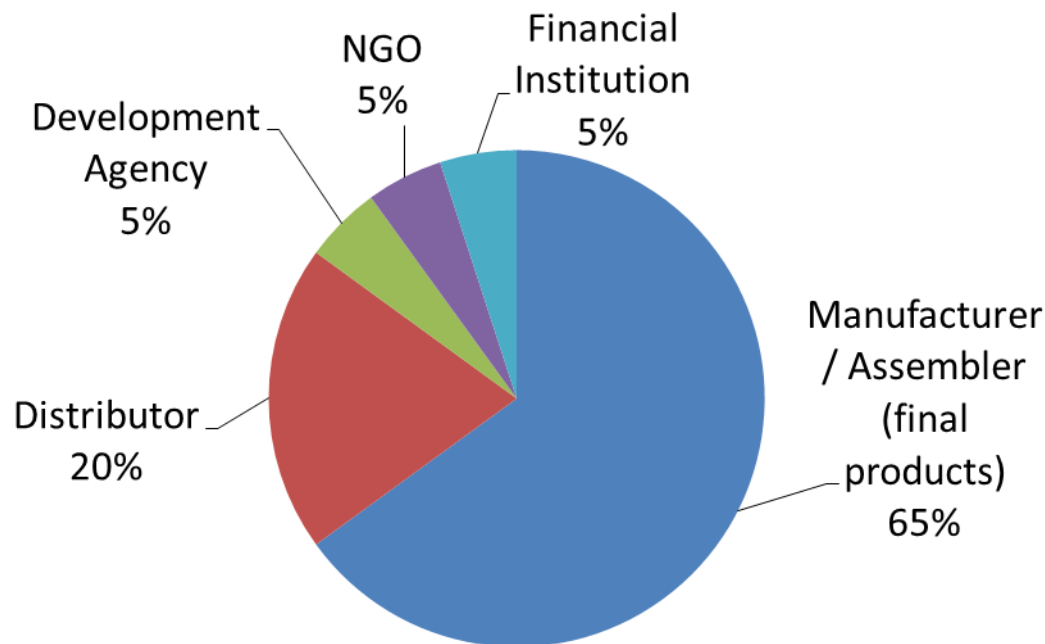
Thank you for your feedback!



Stakeholder Feedback

- We received responses from 20 different and diverse stakeholder organizations
- We grouped your feedback into 48 distinct comments

- We made a number of substantive changes in response to the comments.



Process to Incorporate Comments

When we receive comments, we:

- Read, summarize and, where needed, ask clarifying questions
- Discuss comments with QA team, including collaborators at the Fraunhofer Institute for Solar Energy Systems
- Discuss key issues with program managers in the World Bank and IFC
- Conduct research about key issues where needed
- Present responses in a feedback document
- Present and discuss key issues in this webinar
- Incorporate interim decisions in draft Quality Standards and Test Methods
- Plan to revise the draft Quality Standards and Test Methods over the next year (after receiving additional feedback)

Case Study: System Size Upper Limit

- Our goal is to cover the majority of plug-and-play kits on the market while maintaining a reasonable upper bound to ensure low-cost test methods can safely assess the products
- We initially proposed the following upper limit:
“If multiple solar modules are included, the combined peak power rating is between 10 and 100 watts, while the peak power rating may exceed 100 watts if only a single module is included in the kit.”

Case Study: Upper Limit

- We received several comments regarding this proposed upper limit:
 - An upper limit that differs for single vs. multiple modules is confusing
 - Most plug-and-play systems will be limited to smaller wattages due to maximum ampacity of connectors
 - 100 W is too low; larger systems are desirable and a low limit will exclude products or distort the market
 - The upper limit should be based on current (amperage) rather than power (wattage)
 - System eligibility should be based on service offerings, not wattage

Case Study: Upper Limit

- We discussed the issue among our teams:
 - On the technical side, an upper limit based on a current limit seemed most practical. Low cost test equipment is often restricted to <10 A.
 - For clear communications, a single upper limit based on wattage would be ideal.
- We conducted internet research and reached out to kit producers and found that, out of the 168 plug-and-play kits we identified, only $\sim 2\%$ of the products exceeded 100 Wp.

Case Study: Upper Limit

- We decided that for the initial round of pilot testing, we would allow kits up to and including 100 Wp.
- But...we are still considering a higher and more flexible upper bound, which could be:
 - Based on a current limit of 8-10 A
 - The original proposal, where systems with a single module could exceed 100 Wp
 - Raised slightly higher to 120 Wp
 - Other alternatives that we haven't yet considered

Case Study: Upper Limit

Open for
@questions



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Feedback → Revisions

Based on feedback, we have made substantive changes to the draft Quality Standards in the following areas:

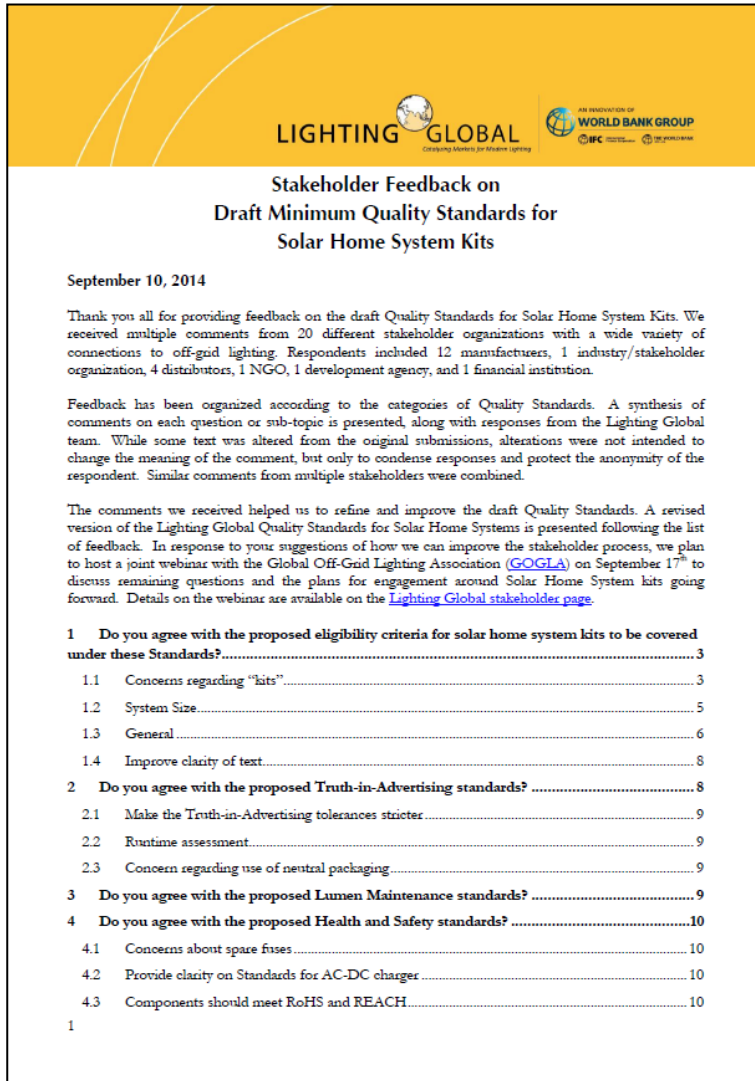
- Limited kits to nominal 50 VDC and 100 Wp
- Clarified that any appliances included with the kit must come with their requisite cables
- Refined the definition of plug-and-play
- Clarified the requirement for circuit protection
- Added that wires, cables and connectors must be appropriately sized for the expected current and voltage
- Required batteries to be field replaceable
- Clarified that the cable length is not prescribed, but does determine the level of IP assessment and durability tests
- Expanded description of requirements for the user manual

Extra, Extra, Read all about it!

Responses to all comments are presented in the stakeholder feedback document on the Lighting Global stakeholder page:

www.lightingglobal.org/activities/qa/stakeholder-engagement/

A revised version of the draft Quality Standards is included at the end.



The image shows the cover of a report titled "Stakeholder Feedback on Draft Minimum Quality Standards for Solar Home System Kits". The cover has a yellow header with the "LIGHTING GLOBAL" logo and the "WORLD BANK GROUP" logo. Below the header, the title is centered. The date "September 10, 2014" is listed. The main text explains that feedback was received from 20 different stakeholder organizations and is organized by category. It also mentions a joint webinar with the Global Off-Grid Lighting Association (GOGLA) on September 17th. A table of contents is provided at the bottom, listing sections such as "Do you agree with the proposed eligibility criteria for solar home system kits to be covered under these Standards?" and "Do you agree with the proposed Truth-in-Advertising standards?".

LIGHTING GLOBAL
AN INNOVATION OF WORLD BANK GROUP
IFC

**Stakeholder Feedback on
Draft Minimum Quality Standards for
Solar Home System Kits**

September 10, 2014

Thank you all for providing feedback on the draft Quality Standards for Solar Home System Kits. We received multiple comments from 20 different stakeholder organizations with a wide variety of connections to off-grid lighting. Respondents included 12 manufacturers, 1 industry/stakeholder organization, 4 distributors, 1 NGO, 1 development agency, and 1 financial institution.

Feedback has been organized according to the categories of Quality Standards. A synthesis of comments on each question or sub-topic is presented, along with responses from the Lighting Global team. While some text was altered from the original submissions, alterations were not intended to change the meaning of the comment, but only to condense responses and protect the anonymity of the respondent. Similar comments from multiple stakeholders were combined.

The comments we received helped us to refine and improve the draft Quality Standards. A revised version of the Lighting Global Quality Standards for Solar Home Systems is presented following the list of feedback. In response to your suggestions of how we can improve the stakeholder process, we plan to host a joint webinar with the Global Off-Grid Lighting Association (GOGLA) on September 17th to discuss remaining questions and the plans for engagement around Solar Home System kits going forward. Details on the webinar are available on the [Lighting Global stakeholder page](#).

1 Do you agree with the proposed eligibility criteria for solar home system kits to be covered under these Standards?..... 3

1.1 Concerns regarding "kits"..... 3

1.2 System Size..... 5

1.3 General..... 6

1.4 Improve clarity of text..... 8

2 Do you agree with the proposed Truth-in-Advertising standards? 8

2.1 Make the Truth-in-Advertising tolerances stricter..... 9

2.2 Runtime assessment..... 9

2.3 Concern regarding use of neutral packaging..... 9

3 Do you agree with the proposed Lumen Maintenance standards? 9

4 Do you agree with the proposed Health and Safety standards?10

4.1 Concerns about spare fuses.....10

4.2 Provide clarity on Standards for AC-DC charger10

4.3 Components should meet RoHS and REACH.....10

1

Key Issue: Plug-and-Play Kits

- Our current definition: ***Plug-and-play implies that no design expertise is required to choose appropriate system components and no technicians or electricians are necessary to safely and successfully install and operate the system. All electrical connections can be made without the use of tools. Installation and operation instructions should be presented using language and graphics that can be understood by the typical consumer.***
- Why focus on Plug and Play Kits?
 - Plug and play kits represent a new and promising approach to delivering affordable energy services in off-grid areas
 - QA framework builds on existing pico-product system
 - Approach allows for assessment of products at point of manufacture rather than the point of installation
 - Standards already exist to cover individual components; plug and play kits are currently not evaluated at the system level

Key Issue: Plug and Play Kits

Open for
@questions



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- Key questions:
 - We would still encourage distributors to install systems and train customers on the operation of the system; how do we make this clear?
 - Should screw terminals be allowed?

Key Issue: Warranty

- Our proposed *minimum* warranty terms:
 - **3 years for the system and PV module**
 - **2 years for the battery**
- We received diverse feedback:
 - **Too long:** not practical, especially difficult for batteries
 - **Too short:** will tarnish the image of solar home systems
 - 3 year warranty should cover full system, incl. battery
 - Warranty terms should not be mandated

Key Issue: Warranty

Open for
@questions



- For now, we will maintain the proposed *minimum* warranty terms:
 - **3 years for the system and PV module**
 - **2 years for the battery**
- But...we would like to collect more feedback from you on appropriate warranty terms before finalizing the quality standards

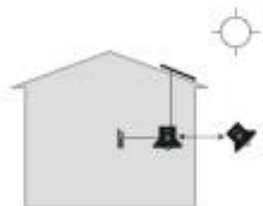
Immediate Next Steps

- Finalize initial test methods
 - Our team is developing an initial set of test methods based largely on the methods for pico-products
- Pilot test initial methods
 - 5 products will be tested
 - Deadline for product testing [applications](#) has been extended to September 22nd
- Continue research on select topics
 - Key research topics for SHS QA implementation include: pay-as-you-go (PAYG), Wh/day metric, strategy for assessment of charge control and PV modules, and others

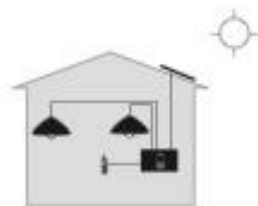


Long-term Next Steps

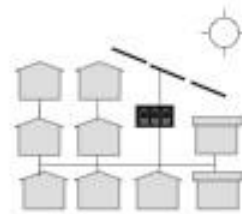
Pico-powered Lighting Sys.



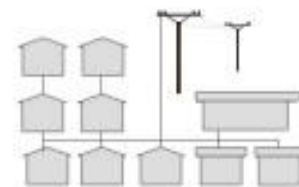
Solar Home System



Micro / Mini-Grid



Regional Grid



Scale (~Watts)

1 – 10's

10's – 100's

100's – 1000's

$10^6 - 10^{11}$

Topology

DC Only

DC – some AC

Mostly AC

Nearly all AC

Loads

Lighting and Phone Charging

Television and Fans

Range of Appliances

Industrial Power

IEC Coverage

62257-9-5

62257-9-6

62257-9-1

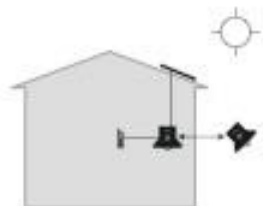
62257-9-2

Wide Range of Standards

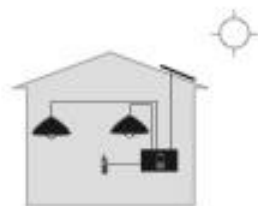
Eventually plan to submit test methods to IEC, likely as a revision of 62257-9-6 (~June 2015)

Long-term Next Steps

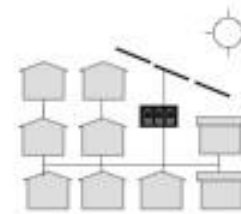
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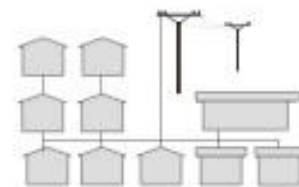
Solar Home System



Micro / Mini-Grid



Regional Grid



Scale (~Watts)

1 – 10's

10's – 100's

100's – 1000's

10⁶ - 10¹¹

Topology

DC Only

DC – some AC

Mostly AC

Nearly all AC

Loads

Lighting and Phone Charging

Television and Fans

Range of Appliances

Industrial Power

LIGHTING AFRICA
Catalyzing Markets for Modern Lighting

AN INNOVATION OF
IFC
International
Finance
Corporation
World Bank Group



LIGHTING ASIA
Catalyzing Markets for Off-Grid Lighting

AN INNOVATION OF
IFC
International
Finance
Corporation
World Bank Group

Regional lighting programs are developing a service offering for manufacturers with products that meet the Quality Standards for solar home system kits (~June 2015)

Thank you for participating

Open for
@questions



Our donor partners

- The Africa Renewable Energy and Access Grants Program (AFREA) • The Asia Sustainable and Alternative Energy Program (ASTAE) • The Energy Sector Management Assistance Program (ESMAP) • The Global Environment Facility (GEF) • The Good Energies Inc. • Italy • Luxembourg • The Netherlands • Norway • The Public-Private Infrastructure Advisory Facility (PPIAF) • The Renewable Energy and Energy Efficiency Partnership (REEEP) • The United States.

What about solar home systems in Bangladesh?

- Driving force is the requirement of a serviceable warranty on components and installation: 5 years for the battery, 20 years for the panel, 1 to 3 years for the charge controller, and 3 years for the lights
- Some components must be tested to meet existing Standards, such as IEC 61215
- For more details visit:
<http://www.idcol.org/home/downloads/solar>

What are typical solar home system quality issues?

- PV modules generally good. Amorphous modules problematic in past, but improving
- Faulty charge controllers, improper disconnect values or manual overrides
- Poor quality batteries or use of automotive batteries
- Lights: CFLs of variable quality and LEDs improving
- Poor design: improper sizing and/or selection of PV module, batteries, and/or other system components
- Poor installation: improper PV siting, lack of air space under PV module, lack of drip loops, poor quality wiring
- Poor maintenance: lack of care for battery/water levels, poor user education, lack of access to service, shading or dirt on PV module

Quality Assurance Principles:

Used in methods for pico-products and plan to use in methods for solar home system kits as well



- Affordability: Seek an appropriate balance between product quality, performance, and cost
- Diversity and Innovation: leave space for product diversity in technology, utility, and price; encourage innovation by using non-prescriptive, outcomes-based goals
- Rigor: Use rigorous tests that can be carried out using reasonably low cost instruments
- Stability: Maintain stable and transparent QA policies so stakeholders know what to expect
- Insight: Effectively communicate key product quality and performance information so buyers can make informed purchasing decisions