

# The Low Cost Energy Technologies (LET) Initiative - Quality Assessment of Pico-PV systems

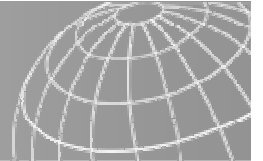
## Content

- Background Pico-PV
- Barriers to dissemination
- Pico-PV Test
- Standards and Quality levels
- Quality problems

Roman Grüner, GTZ

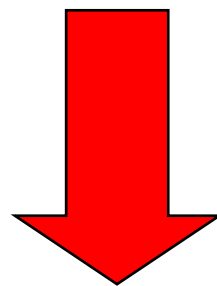
Stephan Lux, Fraunhofer Institut

Accra, 7 May 2008

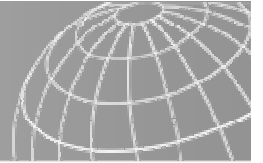


# LET-Initiative: Background

- More than **2 billion people** lack access to modern energy services at present (candles, kerosene for lighting widely used)
- Grid-connected electrification inadequate for remote rural areas
- Decentralised off-grid electrification made progress but success limited

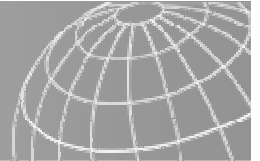


**Costs for end-users are still too high**



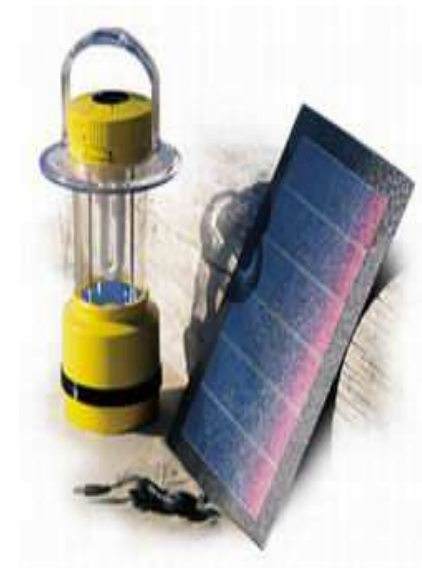
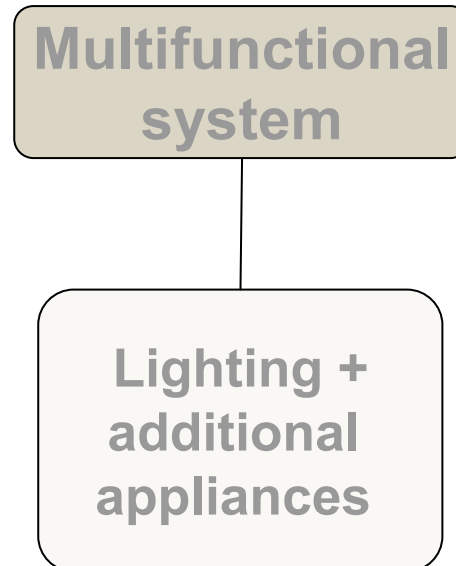
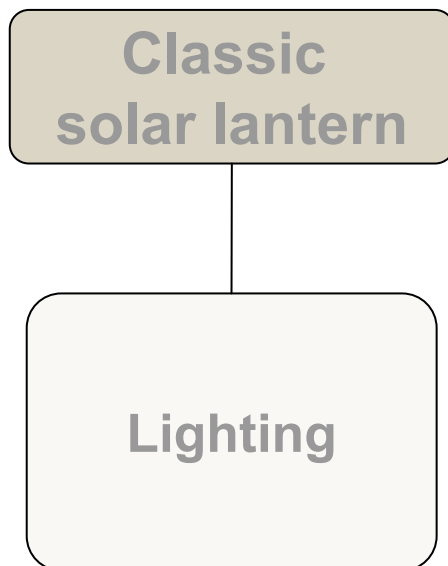
# LET-Initiative: Focus

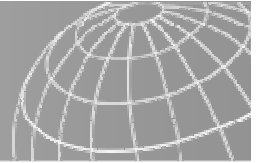
- Need for affordable and adapted systems
- Supply with basic energy services
- Opportunity to improve living conditions of the poorest households
- Target group: „bottom of the pyramid“ /Rural and urban poor
- Development of new and appropriate technologies offer new opportunities (Pico hydro, LED, Pico solar)



# Types of Pico-PV

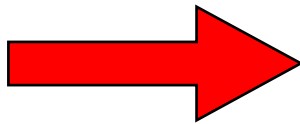
- Focus: Use of efficient small PV systems with main purpose lighting (Pico PV < 30 Wp)





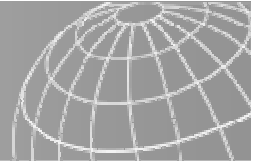
# LET-Initiative: Barriers to dissemination

- Dynamic market for pico-PV with new products but vast differences in quality and price
- Products suitable for rural areas in developing countries



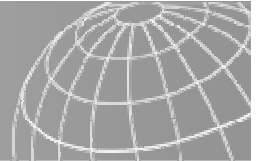
## **Pico-PV tests**

*Bringing transparency into the Pico-PV market*



# Consequences of bad quality products:

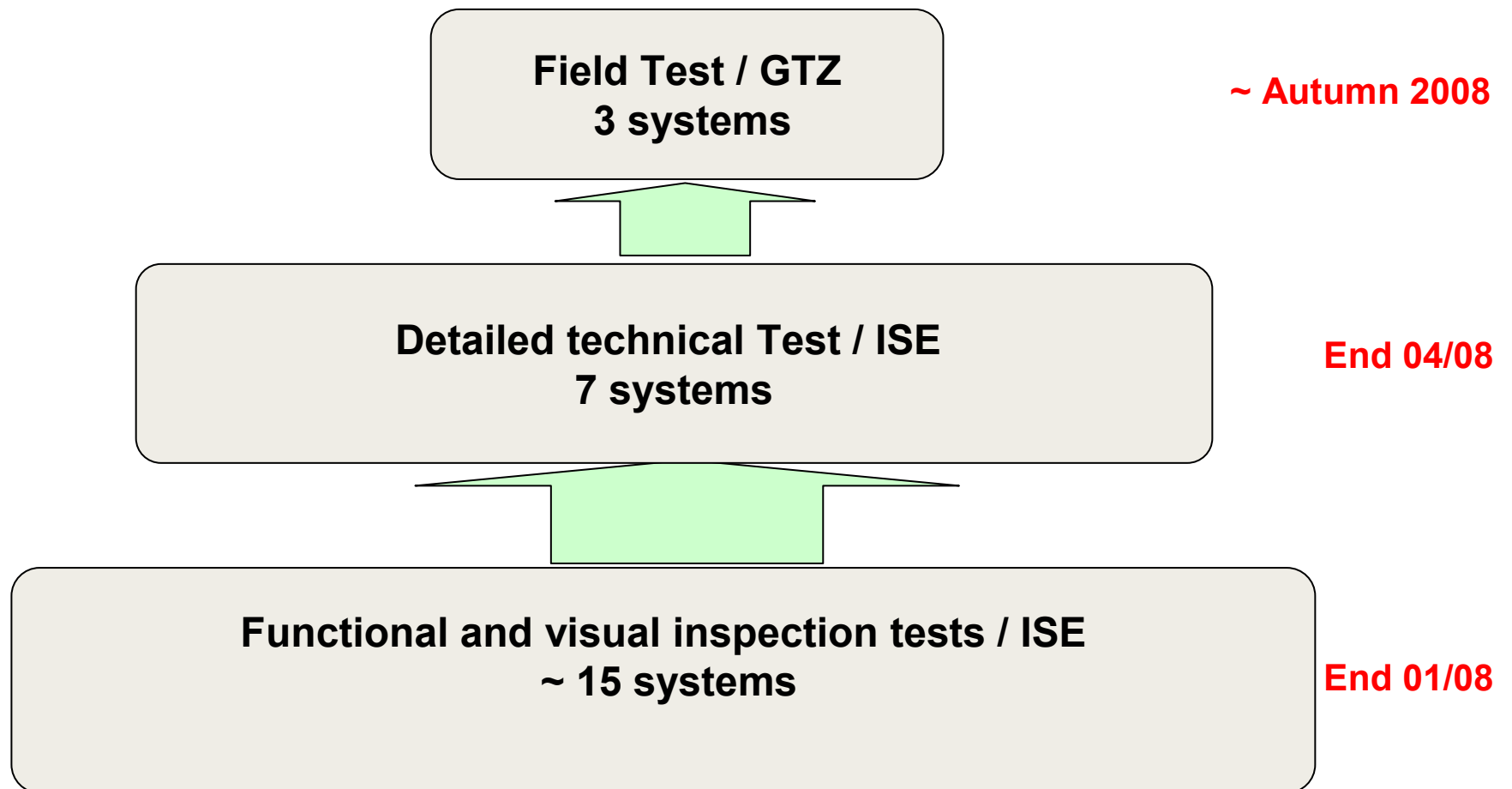
- Reputation loss for a whole product range / sector
- Endangering market development
- Waste of scarce resources
- Environmental hazards

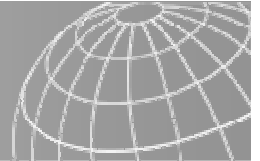


# Test record



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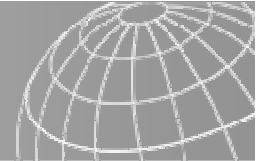




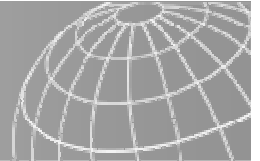
# Test types



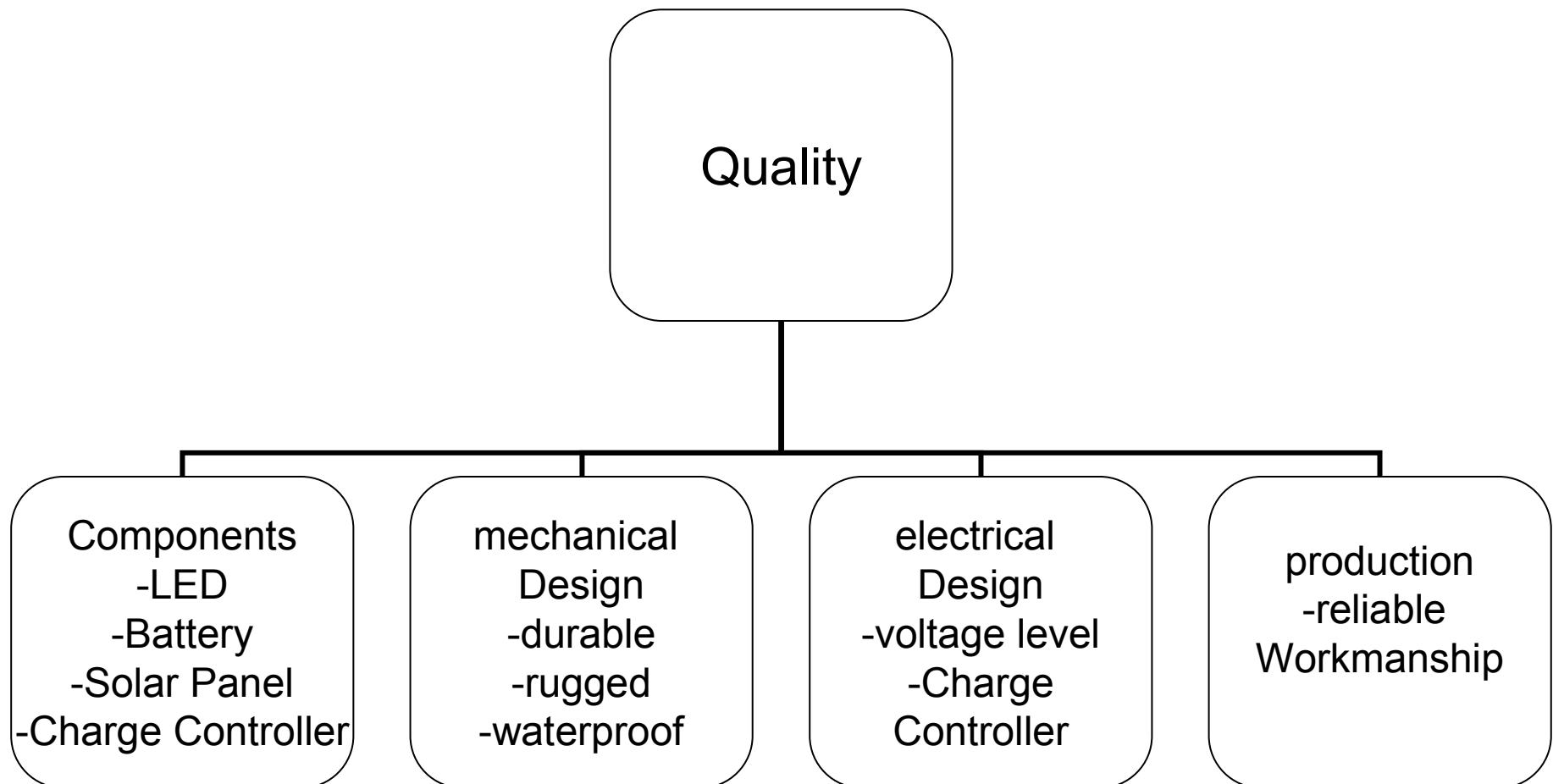
- Astral Solar Technology Co.: *AS 18 and AS 21*
- Cosmos Ignite Innovations: *MightyLight*
- Global Marketing Technologies Inc.: *SL9000WG*
- GTZ Afghanistan: *Solar Home System*
- Macro-solar Technology Co., Ltd.: *MS01*
- Noble Energy Solar Technologies Ltd.: *Aishwarya*
- Sunlabob: *Solar Lantern*
- Solarprojekt Freilassing e.V.: *Solar 2007-1*
- SolEnergy: *2212SL/Wuara*
- Sollatek: *Glowstar GS7*
- Solux e.V.: *Solux-LED-100*
- Würth Solergy: *Sun X-Set Mobile*

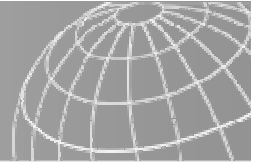


- New technology needs adapted standards (LED-Lighting, NiMhBatteries)
- Integration of components is a new challenge (Charge Controller, Ballast)
- Meeting the high demands with low cost systems



# Where is quality needed ?





# Standards and quality levels

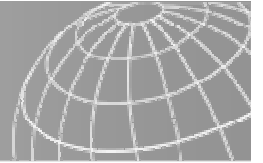


## ■ Institutions

- **CENELEC** European Committee for Electrotechnical Standardization
- **IEC** International Electrotechnical Commission, Geneva
- **ISO** International Organization for Standardization
- **IEEE, ANSI, UL, DIN....**
- **PV GAP** Global Approval Program for Photovoltaics
- **CIE** International Commission on Illumination

## ■ Quality Standard:

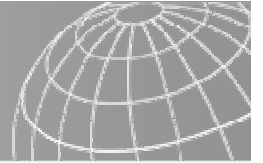
- **PV GAP PVR511A (Portable solar photovoltaic (PV) lanterns–Design qualification and type approval )**



# Problems with existing standards

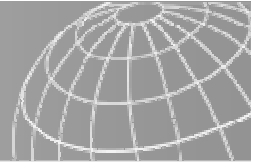


- Not all standards applicable for Pico PV Systems
- New technology like LED and NiMh batteries are not covered by the existing PV GAP Standard
- Large equipment and well trained staff required for testing
- Expensive and long-lasting test procedures lead to long development times for manufacturers
- Development of test procedure for GTZ / Energising Development-LET to assess Pico PV Systems for the field test



# Three Level Testing Procedure for the GTZ

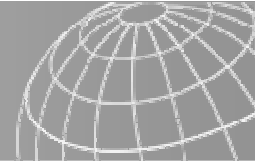
- Goals: faster and cheaper testing, reliable Results
- Level one: sorting out Systems with obvious problems in quality
- Level two: detailed testing to find hidden quality problems
- Level three: long term testing of the light output



# Quality problems



- Bad electrical design
- Bad mechanical design and workmanship  
systems not designed for daily use in developing countries
- Light degradation of the LED (small Power)
- Solar panels and batteries do not show their nominal values

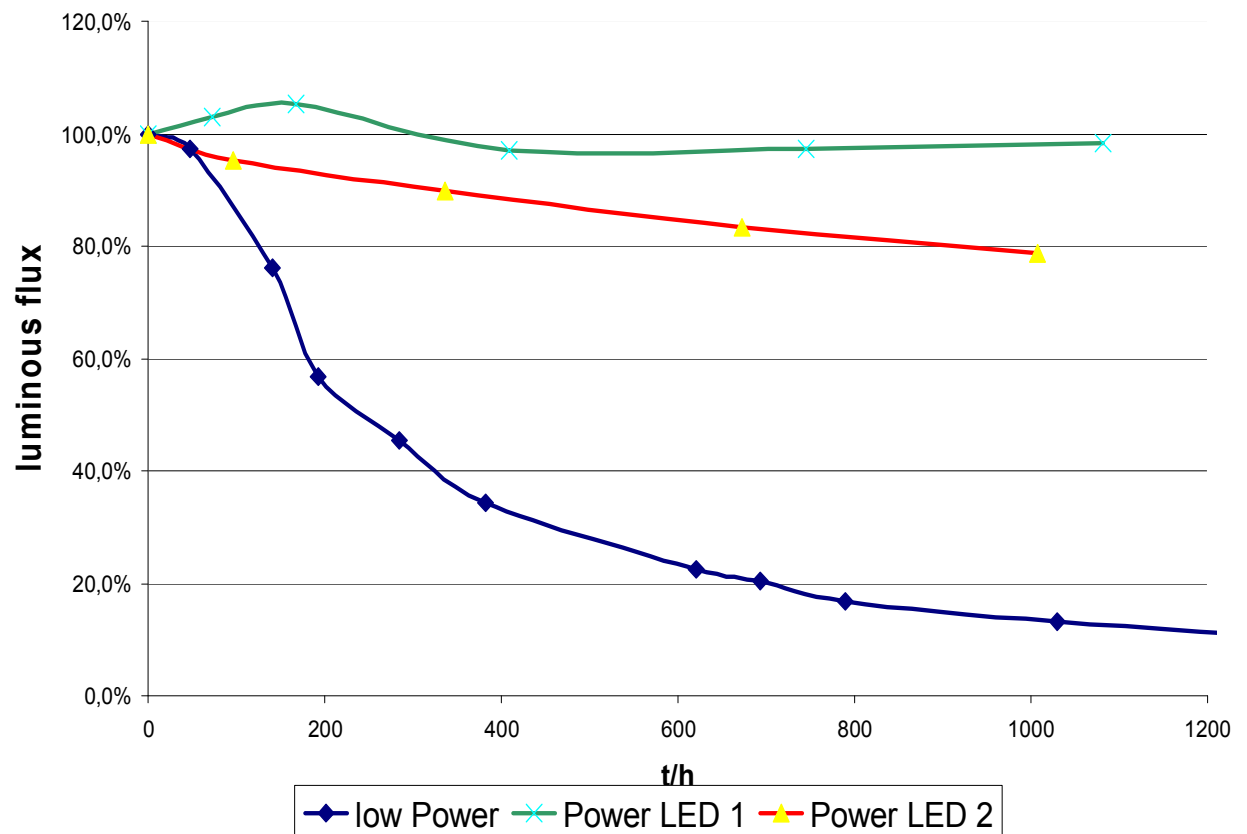


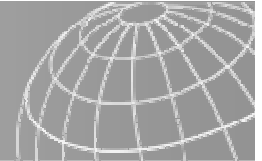
# Degradation of LED



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- 3 Systems under test
- 2 Systems with power LED – long lifetime
- 1 System with a cluster of 32 low power LED - lifetime less than 200h  
typical inferior result for low power LED





## Presentation of test results tomorrow 1.30 pm at Trade Fair



# Thank you for your attention!

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