



RENEWABLE ENERGY INSTALLATIONS INSPECTION FINDINGS

Malawi Energy Regulatory Authority

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Overview Inspection Parameters

- ❖ **System Design**
- ❖ **Sizing of Equipment used**
- ❖ **Installation compliance with standards**
- ❖ **Feedback from end users**
- ❖ **Maintenance and warranty agreements**

Inspection aims to Confirm or check System Design with respect to

- System load / demand requirements
- System Generated capacity
 - System losses
 - System Autonomy
- System Storage capacity vs generation
- System and end user protection
- End User training
- Signed agreements

Major weaknesses of solar PV systems are linked to poor system design

- Under estimation of total load
- Exclusion of system generation losses due to practical deviation from Standard Testing Conditions (STC). Losses can be due
 - Due to temperature increase about 10%
 - Fine dust/dirty on modules about 7%
 - Mismatch and wire losses about 5%
 - DC to AC conversion about 10%
 - Total losses may add to 32%

Common shortfalls found during inspections

- Wrong module orientation and mounting
- Little or limited end user knowledge
- Poor battery housing or safety
 - Need for proper battery boxes or rack
- Certified installers working on behalf of illegal (uncertified) installers
- Poor system earthing
- No proper labelling

Fixed mounted solar panels should face North



A failed solar system at a secondary school in Dowa



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The Dowa installation had 33 solar batteries made by different manufacturers.

- **19 Ecco batteries rated 12V, BA 39 Ah**
- **3 Northstar batteries rated 12V, 165Ah**
- **5 Solarmax battery rated 12V, SM 70 Ah.**
- **6 Deltec battery rated 12V. (No capacity)**

Typical solar PV mini-grid installation in Nsanje transmitted at 11kV

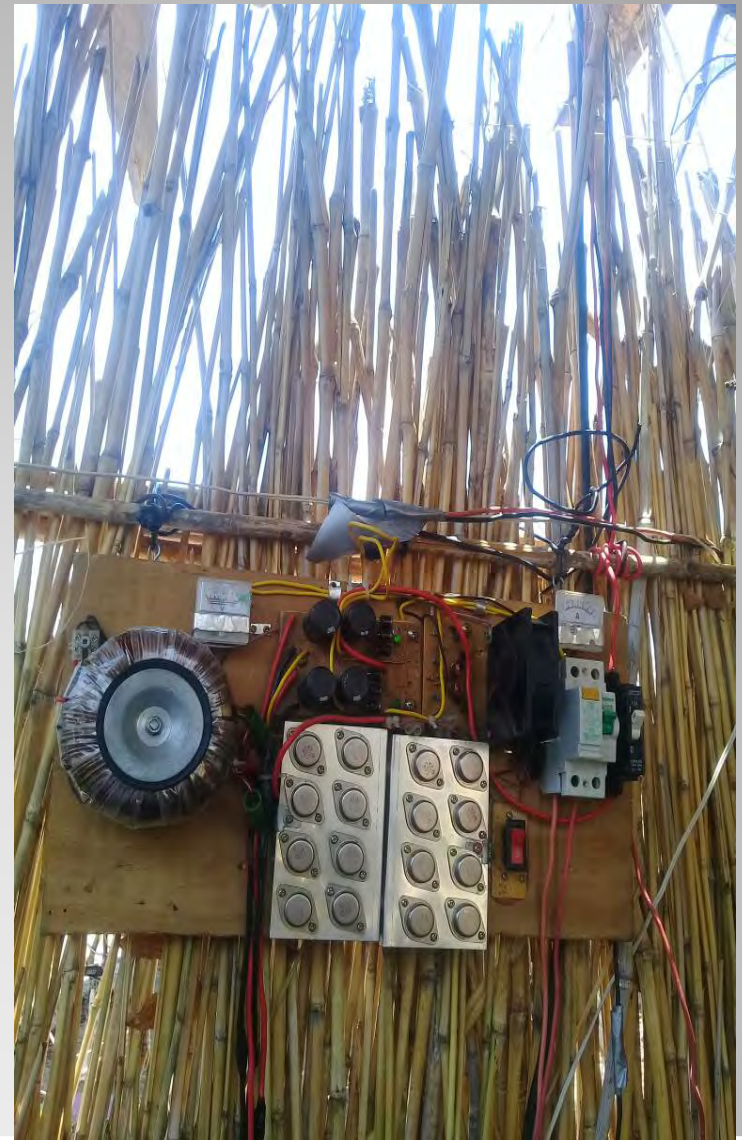


Standard battery specification label fixed to the product



Factoring in of adverse weather conditions in solar PV design





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The system was designed by two young self-made Engineers in Liwonde.

- **Solar System is powering the entire eco-lodge including lights and refrigeration (in the picture)**
- **No inverters involved**
- **No charge controllers involved**
- **Self made circuitry**
- **Energy stored in old and mismatched batteries**

Standard Specifications and Codes of Practice available at MBS

- **Solar Home systems**
- **Mini-grid systems**
- **Solar water Pumping**
- **Solar Water Heating**
- **Hybrid systems**
- **Pico products**

The law requires all installers to

- **Report all installations to MERA**
- **Sign Product warranty and maintenance agreements with the client with copy sent to MERA**
- **Renew licences annually**

THANK YOU