RELITEC
Reliable Energy Solutions

OFF-GRID POWER FORUM
at Intersolar Europe 2014

Summary of experiences from Myanmar

Dipl. – Ing- Richard Schlicht

The Company

RELITEC
Reliable Energy Solutions

Founded in 2011 by

Dipl.-Ing. Richard Schlicht, 20 years experience in solar industry,
leading positions in various solar companies, international consultant.

Than Aye, BEng, MSc, Electrical Engineering and Telecommunications Professional,
Born in Myanmar, living and working in UK and Germany since 1980.

Mission: System Design, Engineering of Solar Energy Systems and Energy Efficient Solutions. Consultation. Training. Distribution of Solar PV Products.

Offices: London, Berlin, Yangon.

RELITEC
Reliable Energy Solutions

Experience, Expertise

MW scale power plants

Engineering, procurement, construction and operation of over twenty MW-scale Solar PV Power Plants in Europe with a wide variety of technologies (module and inverter technologies, fixed and tracking systems), soil conditions and climates.

5 MW Germany 2004
Formerly largest PV installation worldwide

11 MW Germany 2006
Dual axis trackers

1.1 MW Spain 2008
Single axis trackers

RELITEC
Reliable Energy Solutions

Experience, Expertise

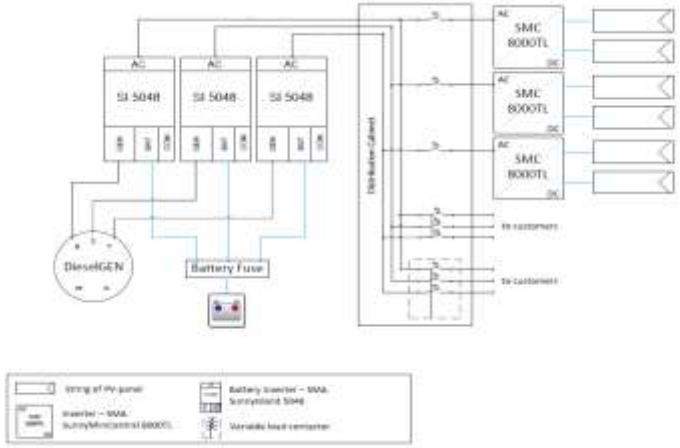
MW scale power plants

5 MW, Czech Republic, 2009

4 MW, Rooftop, Malaysia, 2012

Solar Hybrid Systems

Detailed system simulation, financial feasibility calculations, installation and operation.



Single line for first Myanmar 20 kW Solar PV - Battery - Diesel System for Medium Business in Dawei.
Amortization period less than 5 years.
Commissioned in September 2012.

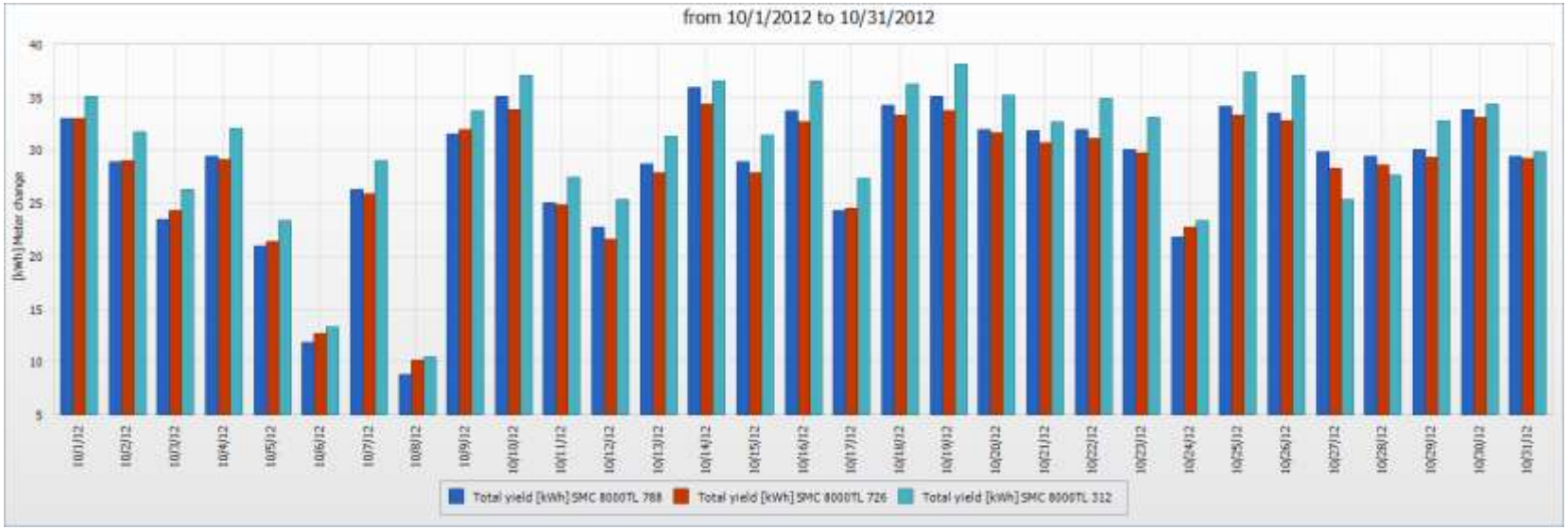
Solar Hybrid Project
Dawei 22 kWp

RELITEC
Reliable Energy Solutions

Solar hybrid project: 22 kWp PV, 2500 Ah/48 V OPzS Battery, 3 x 5048 Sunny Island. Built in September 2012 and will save the owner 250.000 l diesel fuel over 20 years, compared to continuing running the business on diesel only.

RELITEC
Reliable Energy Solutions

Performance evaluation



Performance evaluation October 2012: Solar energy production is according to expectations, availability of the system is 100%.
Total energy production in October: 2700 kWh.

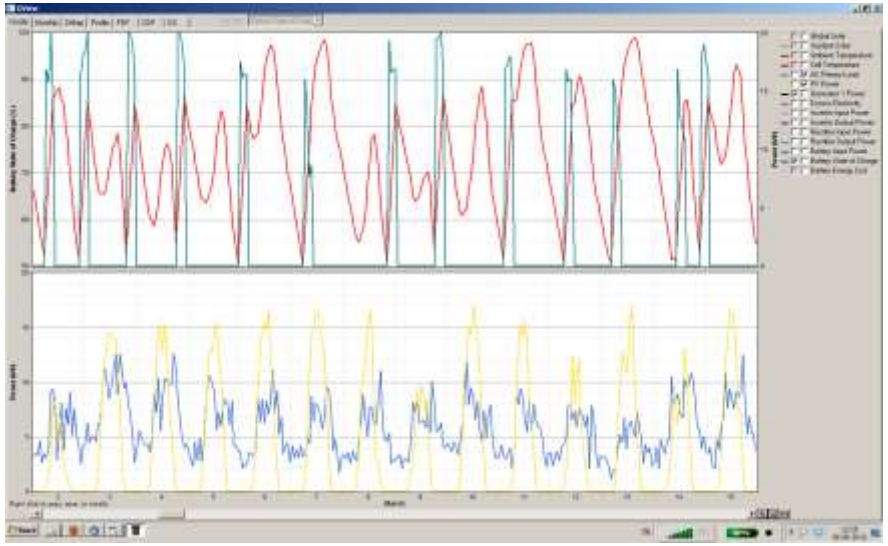
Training

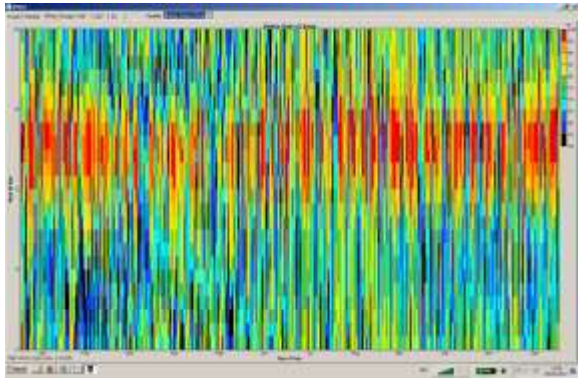
RELITEC
Reliable Energy Solutions

Extensive training of the local technical staff has been part of the project implementation.
Relitec monitors the system online and evaluates the performance together with the local technicians.

System simulation

RELITEC
Reliable Energy Solutions





The system design is optimized with advanced simulation software to achieve the best overall cost efficiency.

RELITEC
Reliable Energy Solutions

Scope of Services

Engineering

System Analysis, System Design, Simulation and Optimization, Basic and Executive Engineering, Construction Supervison and Quality Control.

Consulting

Optimized System Solutions and Technology Strategies, Vendor Selection, Component Sourcing, Market Analysis, Delivery-, Construction- and Operation Contract Optimization.

Turn Key Installation

Site Management, Project Management, Detailed Quality Control, Commissioning.

Operation and Maintenance

System Monitoring, Perfomance Analysis and Optimization, Preventive and Corrective Maintenance, Reporting.

Energy Efficiency Consultation

Evaluation of Status Quo, Recomendation of Improvements and Options, Technical and Financial Feasibility Calculations, Implementation.

Training

Basic and High Level Training, Customized Training Courses and Seminars.

Market segments for solar PV in Myamar (1)

RELITEC
Reliable Energy Solutions

1. Off grid

Approx 2/3 of population without grid connection, however very little income available for energy, national grid expansion will take many years to come.

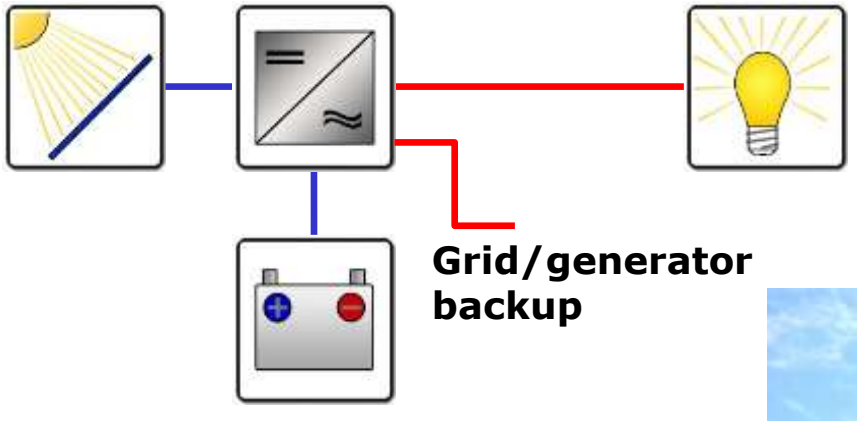
• **1.1. Pico PV** (lighting, battery chargers)	biggest segment, but even here financing solutions are key for mass market
• **1.2. SHS PV-battery** (light, TV, fridge…)	only for wealthier persons
• **1.3. SHS PV-battery + occasional grid**	some villages, only wealthier persons
• **1.4 small/medium business solutions**	PV/Battery/Diesel Hybrid (and/or small hydro, biogas or other RE)
• **1.5 solar pumping**	Picking up
• **1.6 village electrification**	Privately financed systems will result in very high electricity rates >0,7 $/kWh => low interest loans and donor funds required.

⇒ **All solutions depend heavily on possibility to offer financing solution to customers, (local banks will not finance)**

⇒ **Most solutions need a minimum time frame (typically 5-8 years), often this is too long for customers/uncertainty of future (cheap) electricity from nat'l grid.**

Example off grid system Myamar (1.3)

RELITEC
Reliable Energy Solutions



Grid/generator backup

AC Loads
- Lights
- Refrigerator
- TV
- Pump…

Market segments for solar PV in Myamar (2)

RELITEC
Reliable Energy Solutions

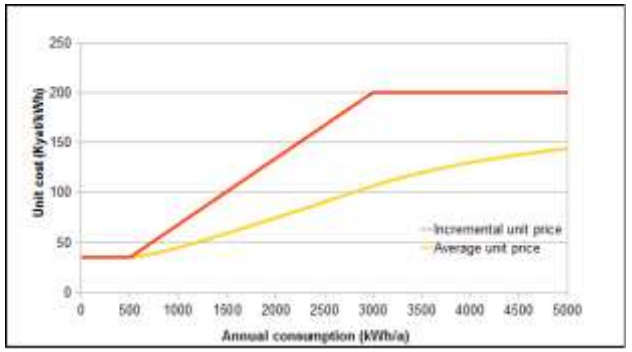
2. Grid connected PV

Electricity prices very low (5 $ct/kWh residential, 7,5 $ct/kWh commercial) => no business case for solar PV.

2.1. Residential and commercial	no business case
2.2. Back up systems (grid interruptions)	Normally UPS only (Solar PV = optional)
2.3. LSPV power plants	Depends on bankable PPA terms with natl. Gov't, requires tariff >> 100 $/MWh.

⇒ **Gov't is aware of need to raise electricity prices but reluctant in view of reduced income of main population.**

Solution: progressiv tariffs.
=> can open the way for solar PV.



Challenges for solar PV in Myamar

RELITEC
Reliable Energy Solutions

Financing

Solar PV = upfront investment, long payback periods => requires long term financing plan

Local banks don‘t finance => private solutions (expensive)

Long term planning uncertainties

Future development over >> 5 years often uncertain (expansion of nat‘l grid, IPP license…)

Tradition of short term planing and business thinking.

Cheap electricity

Cheap electricity from nat‘l grid is the benchmark, also in many off grid situations.

Low price mentality

Customers tend to focus on low cost components (abundantlly available), little appreciation for long life components, quality and performance.
Also charateristic in national tender programs.

Technical knowlege, quality awareness

Low level of knowlege of component distributors, installers and customers

Challenges for solar PV in Myamar (technical - QC)

RELITEC
Reliable Energy Solutions

Lessons learned

RELITEC
Reliable Energy Solutions

Market for Solar PV

Very small, despite huge potential demand, basically only pico PV and a few SHS and custom designed business solutions and solar pumping.

New impulse by mobile telecommunication rollout (PV-Diesel hybrid systems for off-grid locations) => ESCO model offered by Relitec in partnership with Sunlabob.

=> System supplier to provide financing solution.

Rural electrification

Enormous challenge: 40.000 villages without electricity, privately financed solutions too expensive, requires concerted national plan with int'l support (Masterplanning ongoing)

Tecnical knowlege, quality awareness and low price mentality

Reduced level of technical knowlege => PV system performance often poor/insatisfactory, market flooded with cheap low quality components, little/no tradition of component warranty and after sales service, little customer awareness of longevity.

Contact data

RELITEC Ltd UK
Office 404, 4th Floor
Albany House
324/326 Regent Street
London W1B 3HH
Tel.: +44-7900 804043
t.aye@relitec-energy.com

RELITEC Germany
Flatowallee 16/860
D-14055 Berlin
Tel: +49-30-6098 7209
Mobile: +49-172-3048865
r.schlicht@relitec-energy.com

RELITEC Yangon
No. 6 Padauk Street
Pyi Daung Su Yatmon
Thingantung
Yangon
Office: +95-9-4211 49524
yangon@relitec-energy.com