Training demands for workforce development

International Academy For Renewable Energy & Energy Efficiency

iAREEE
International Academy for Renewable Energy & Energy Efficiency

Egypt 1987

Egypt 2017

SOLAR PV Market

Recent solar cost reductions and increasing awareness of the potential benefits of solar technology, has compelled Egypt to launch programs To accelerate solar deployment.

The application of solar-based power is emerging as the preferred solution due to its predictability in supply, scalability and zero-fuel input. Solar pumps are the most feasible non-fossil-based technology for water pumping .

With a clear benefits on Both Farmers & Governments.

Benefit of Farmers & Agriculture Developer

- Supply of energy and improved access to water for irrigation
- Improved crop yields and increased incomes
- Reduced manual work and improved expenditure of time
- Enhanced crop resilience and food security
- foods with high-value crops
- Additional benefits for health, education and poverty alleviation

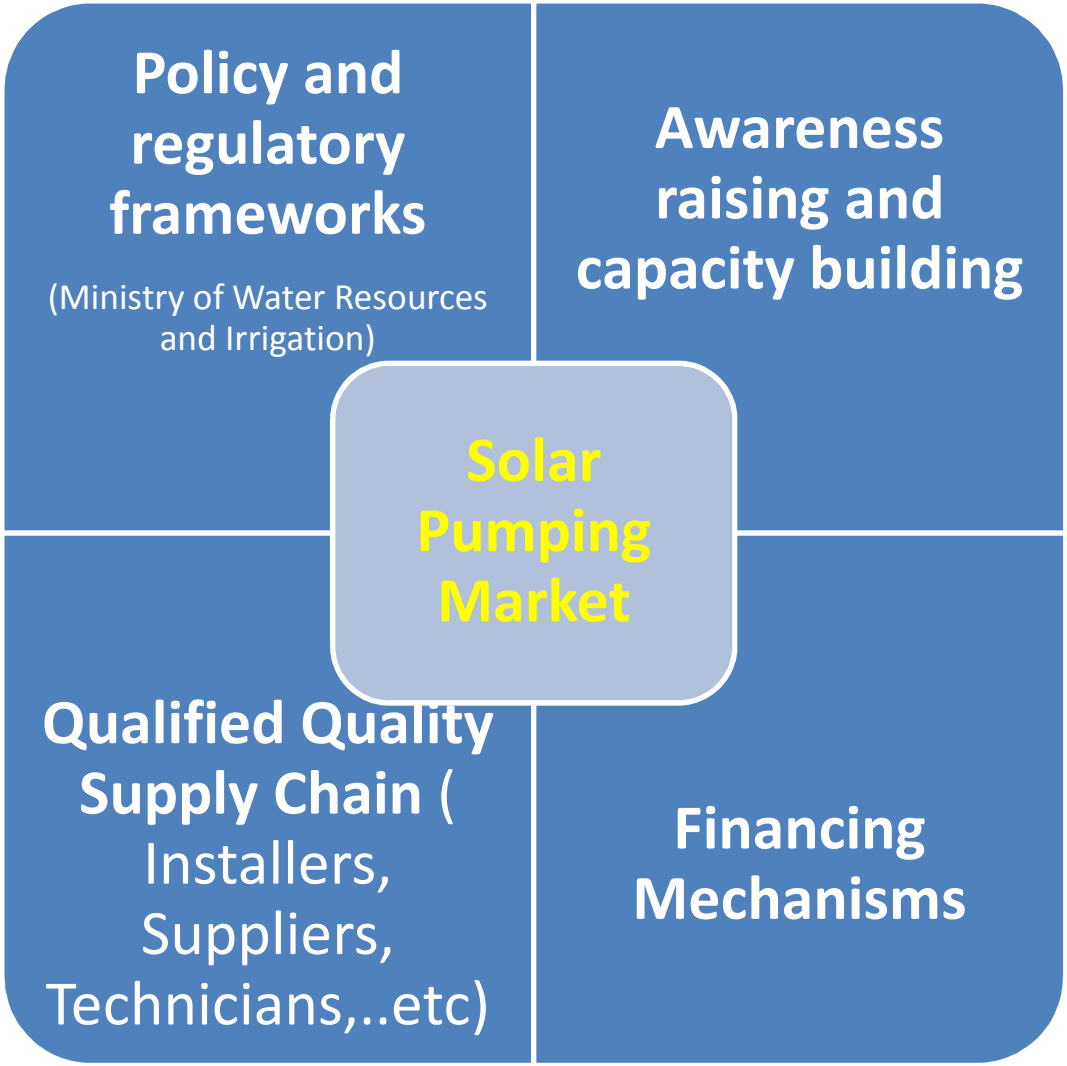
Benefit of Governments

- Reduction in electricity and fuel use
- Subsidy savings
- Reduced fuel imports
- Creation of small businesses/employment across the value chain
- Improved reliability of power systems
- Increased agricultural economic output.
- Increased area of agricultural.
- Emissions reductions

SOLAR Pumping Matrix

Solar-based irrigation solutions in Egypt based for last years on a project by-project basis, BUT, it now requires continued market building efforts to exploit their full potential.

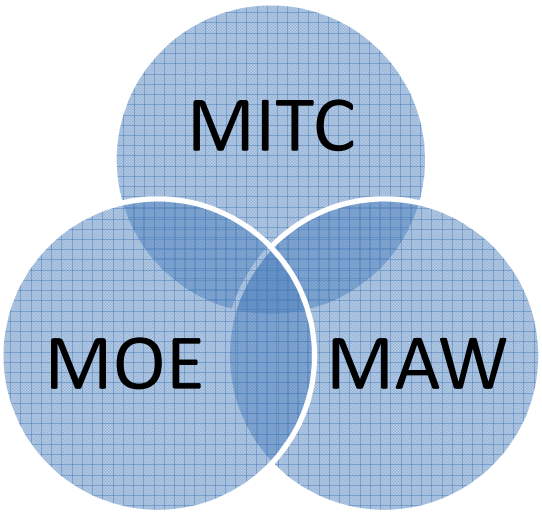
To cope with potential technology penetration growth requires prudent consideration of, the following roles



Regulatory frameworks

Policies, regulations and procedures are required to create a level playing field for solar PV water pumping via conventional irrigation systems (electricity/diesel powered pump sets).

All the different ministries and departments need to have a unified approach to cover the different aspects of bringing the solar PV water pumping system to the farmer.



Capacity building of concerned Governmental Department to be able to set an adequate policy and regulatory framework that encourages renewable energy application in general and solar PV water pumping in particular.

Regulatory frameworks

Policy and regulatory frameworks
(Ministry of Water Resources and Irrigation)

Due to the steady increase in the installation of solar systems and the variation in the quality of the installation between the companies, the Ministry of Irrigation and Water Resources has to regulate the work of companies by:

- qualifying and licensing Installers.
- Approve any solar pumping installation similar to well approval process to audit the quality of installed materials and the pumping limit that meet the crops needs and ground water inventory.

وزارة الموارد المائية والرى
جمهورية مصر العربية
Ministry of Water Resources and Irrigation
Arab Republic of Egypt

Awareness raising

Low Awareness

Among Consumers and Other Relevant Stakeholders Often farmers are not even aware about the importance of quality of a solar powered system or perceive them to be very expensive and hence, short life , low quality product installed un properably impacting the concept and educate the farmers how to handover such systems and what to expect.

Adequate resources and market intelligence data is required to motivate investment choices of the many ‘watching and waiting’ companies to actually invest in building the sales and service infrastructure.

Develop materials, instructional methods, media, lessons and hands-on activities that support the achievement of the objectives.

Awareness raising

Legislative and regulatory bodies need to issue a guideline for installer to design the Solar pumping systems to various type of irrigation needs, as well, Guide for farmers for selection the most suitable system for there needs

Best Practice Guide for installers

Buyer Guide for Farmers

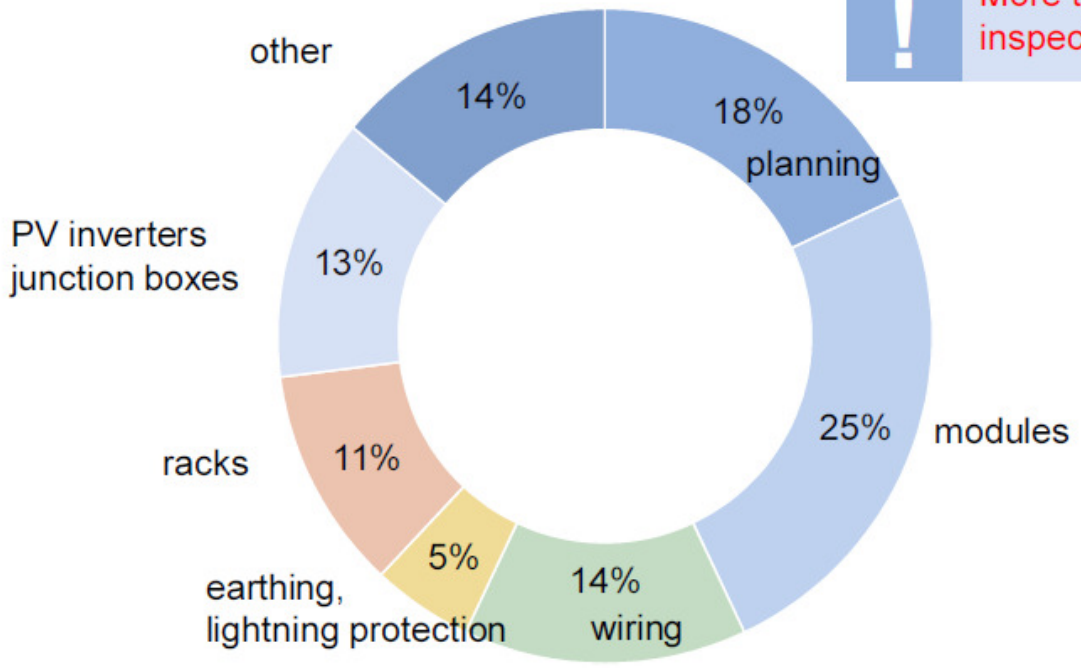
Qualified Quality Supply Chain

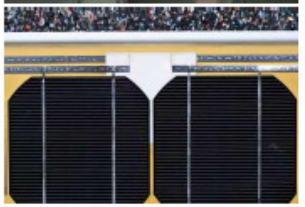
Qualified Supply Chain (Installers, Suppliers, Technicians,..e tc)

Typical faults in the Now

- results from 125 inspected and evaluated large-scale plants
- 20 % show severe defects (immediate need for action)
- a further 10 % show a high frequency of failures
- approx. 50 % of defects in individual segments are caused by installation faults

More than 4 GWp inspected until now





Source : TUV

iAREEE International Academy for Renewable Energy & Energy Efficiency

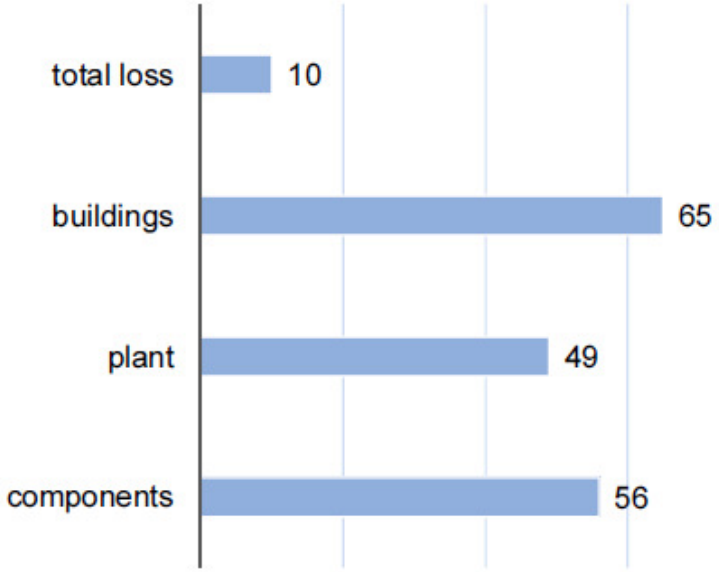
Qualified Quality Supply Chain

Qualified Supply Chain (Installers, Suppliers, Technicians,..etc)

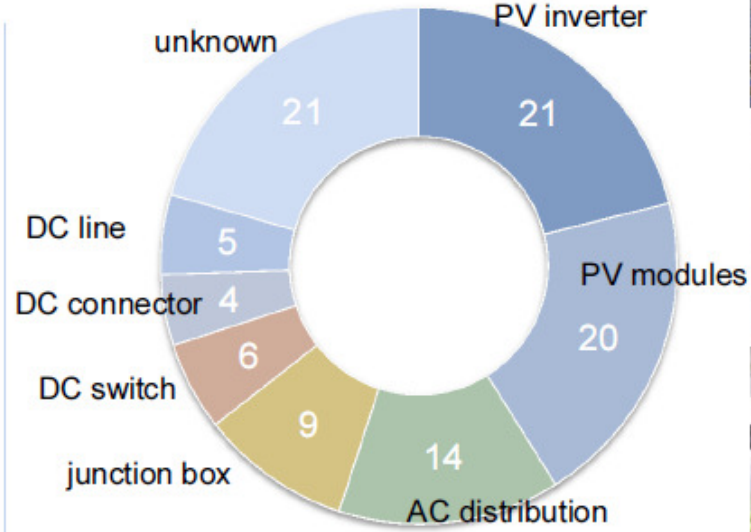
Photovoltaic power: risk of fire

180 heat- and fire damages within the past 5 years caused by PV plants

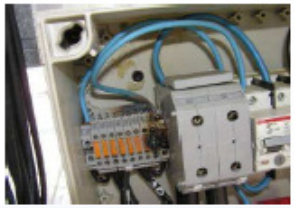
Severity of damage



Cause of error



Quelle: Forschungsprojekt Vorbeugender Brandschutz bei Photovoltaik-Anlagen



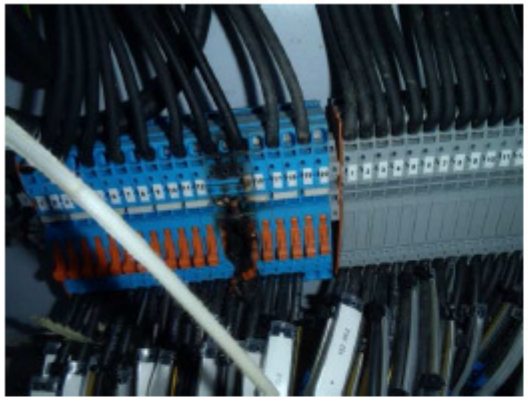
! at least 50 % of all errors are caused due to wrong installation

Source : TUV

iAREEE International Academy for Renewable Energy & Energy Efficiency

Qualified *Quality* Supply Chain

Qualified Supply Chain (Installers, Suppliers, Technicians,..etc)



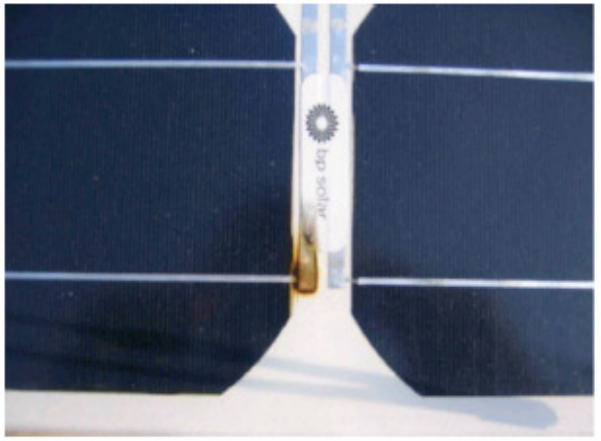


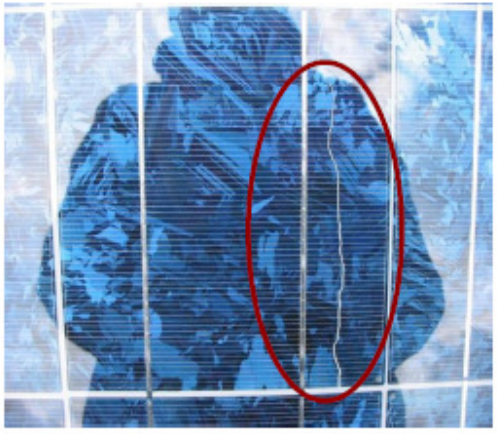

Source TUV

Qualified *Quality* Supply Chain

Qualified Supply Chain (Installers, Suppliers, Technicians,..etc)

Burnt junction box





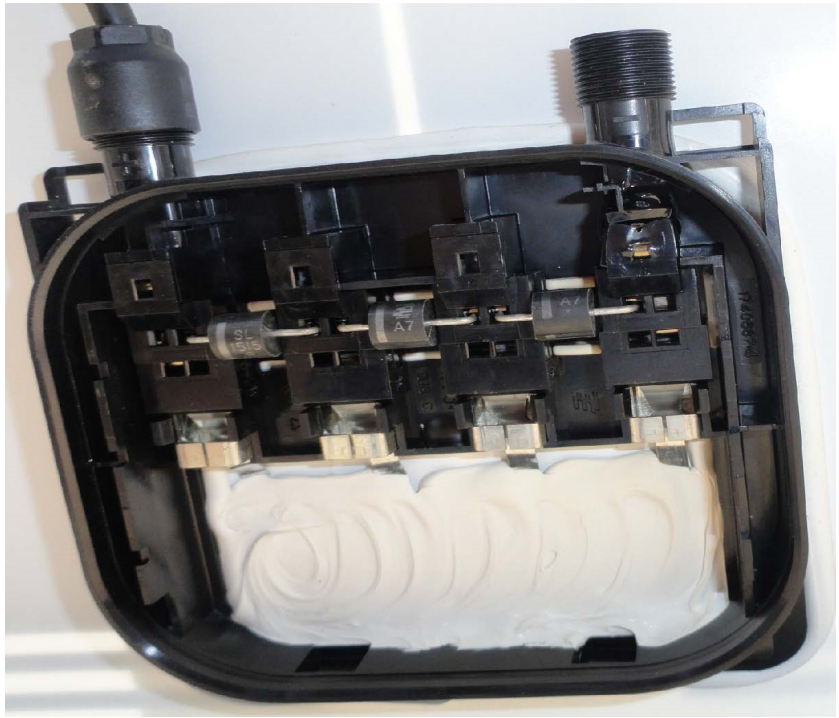
Arcs due to bad solder connectors may cause damage to modules or even fire

Broken cell, similar behavior as a shaded cell

Source : TUV

Qualified Quality Supply Chain

Qualified Supply Chain (Installers, Suppliers, Technicians,..e tc)



Melting of the JB from inside due to high temperature at the interconnection

Module failure due to arching

Source : TUV

Qualified Quality Supply Chain

Qualified Supply Chain (Installers, Suppliers, Technicians,..e tc)

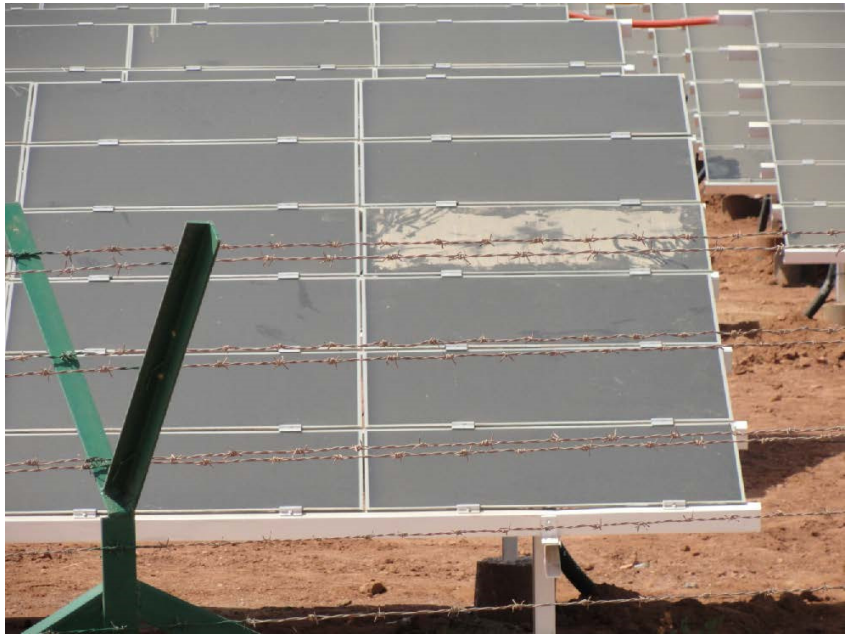
Defects that leads to failure
- Wind load calculations

Defects that leads to failure
- Wind load calculations

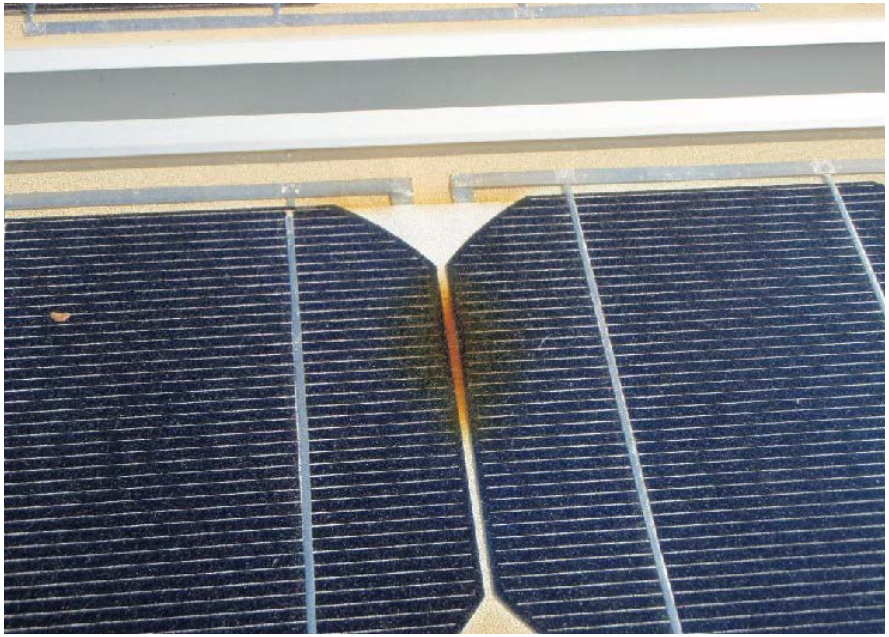
Source : TUV

Qualified Quality Supply Chain

Qualified Supply Chain (Installers, Suppliers, Technicians,..etc)



Poor maintance



Module failure due to arching

Source : TUV

Qualified Quality Supply Chain

Qualified Supply Chain (Installers, Suppliers, Technicians,..etc)

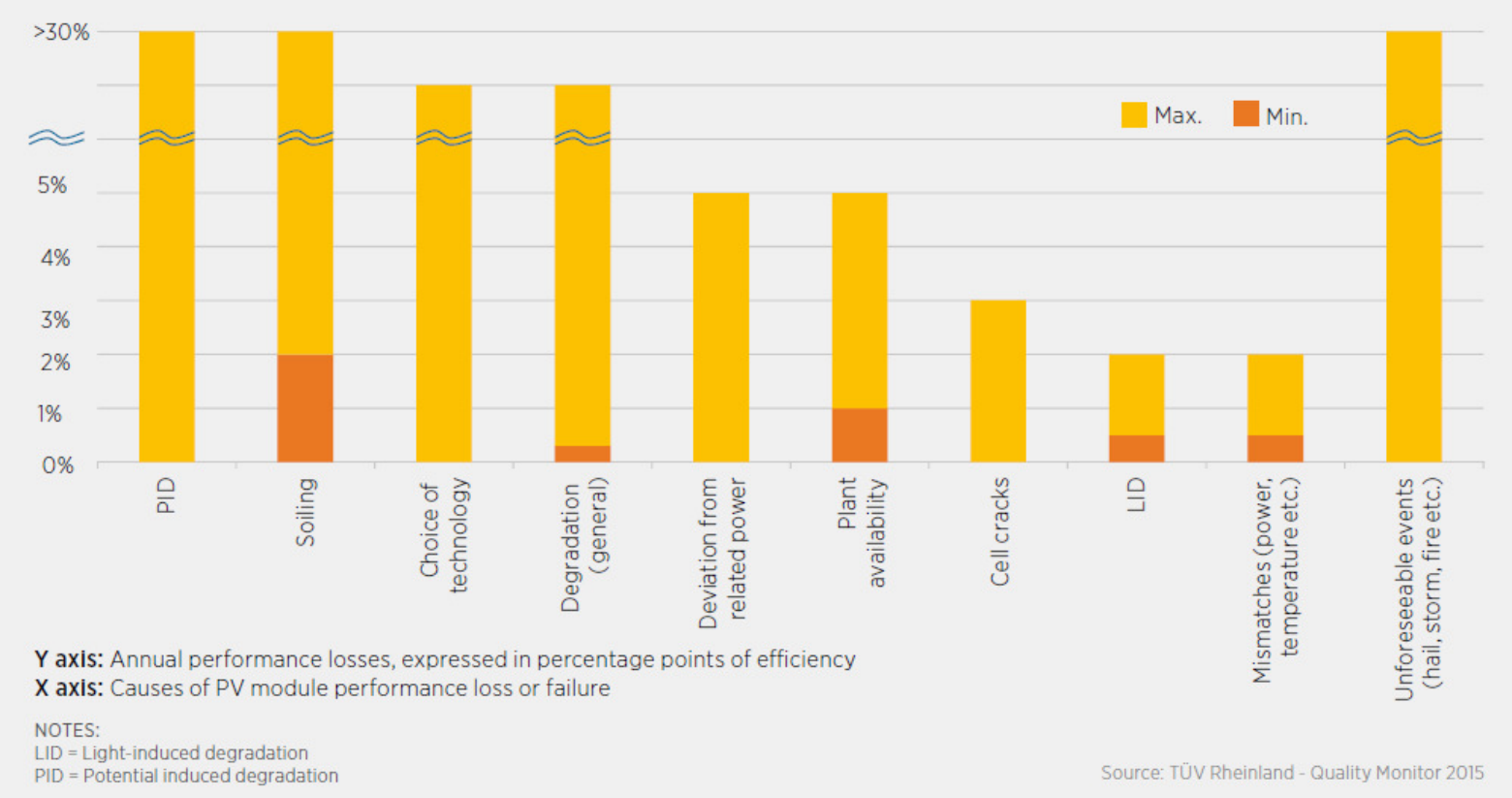
To meet the financial expectations of SOLAR Pumping plant investors, actual electricity production must match planned production as defined in the engineering, procurement and construction (EPC) contract.

Results from pilot campaigns indicate several considerations related to equipment and system quality that can have a major impact on the financial revenues of PV projects, with shortcomings potentially eroding revenue by 30% or more.

Qualified Quality Supply Chain

Qualified Supply Chain (Installers, Suppliers, Technicians,..e tc)

The following example illustrates the impact of such technical risk. For a 1000 KWp plant with approximately 4000 PV modules and a capital investment of 1.4 million USD.



Qualified Quality Supply Chain

Qualified Supply Chain (Installers, Suppliers, Technicians,..etc)

A 15-20% fall in performance due to quality issues would not only represent leverage losses of approximately 250,000.00 EGP per year but also leverage losses in crop season.

International standards, testing and certification are among the most reliable instruments to mitigate technical risk for PV projects and ensure that the expectations of financial sources and end-users are met.

There Where the Legislative and regulatory bodies role came.

Capacity Building

Awareness raising and capacity building

Capacity building Objective

- Decrease the gap between the desired degree of performance (skill, knowledge or attitude) of rural area Solar base Energy Generation and the current situation.
- Raise the competence of Governmental bodies to be able to set an adequate policy and regulatory framework that encourages renewable energy application in general and solar PV water pumping in particular.
- Increase the financial Institutions Knowhow capabilities to tale schemes cop with current market situation and project evaluation.

Capacity Building

Target Audience:

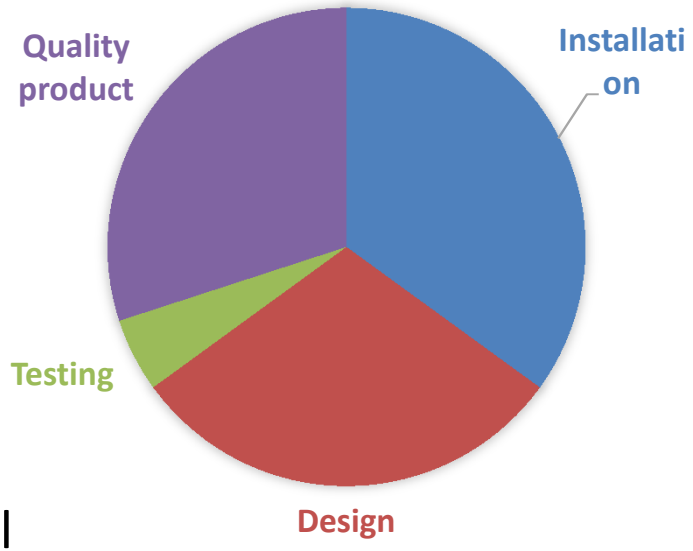
- Electrical technical / commercial Engineers
- Mechanical Engineers
- Skilled Technicians
- Financier
- **Governmental Bodies**

Capacity Building

Awareness raising and capacity building

Capacity building requirements of the potential installers workforce at Solar Pumping sector:

- Farmers Needs assessments for variant needs capacity & climate data.
- Develop & Quote proper design by integrating proper quality equipment's with predictable Energy that will generated with a minimum real output tolerance.
- Implementing and installing systems according to technical best practice standards to deliver the propose energy.
- Ability to test and handover the system to the farmer.
- Execute Operation or/and Maintenance plans.

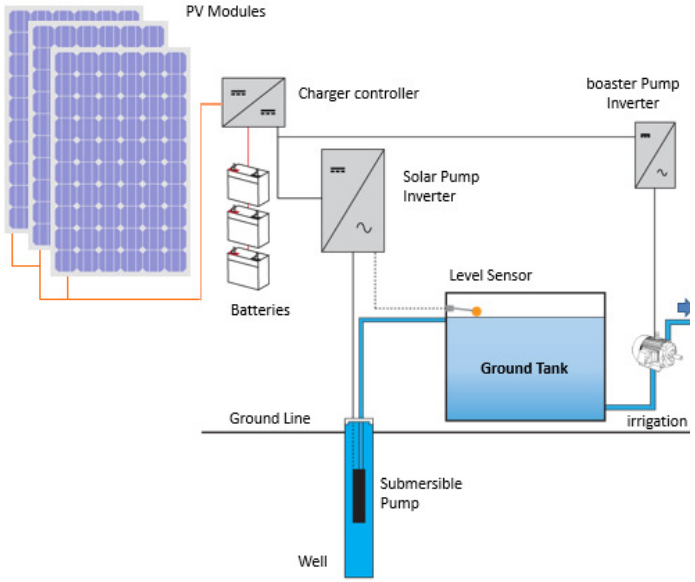


Capacity Building

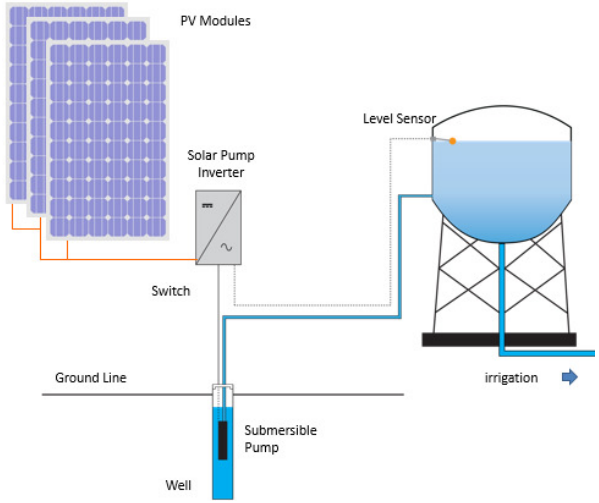
Awareness raising and capacity building

Training on different irrigation systems that keep pace with the nature of different crops , whether small/medium or large scale , daytime irrigation or night irrigation

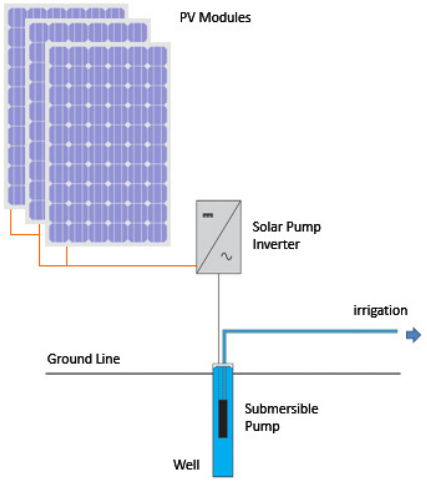
Small & Medium Scale:



- **Night Irrigation with ground storage**



- **Night Irrigation through storage**

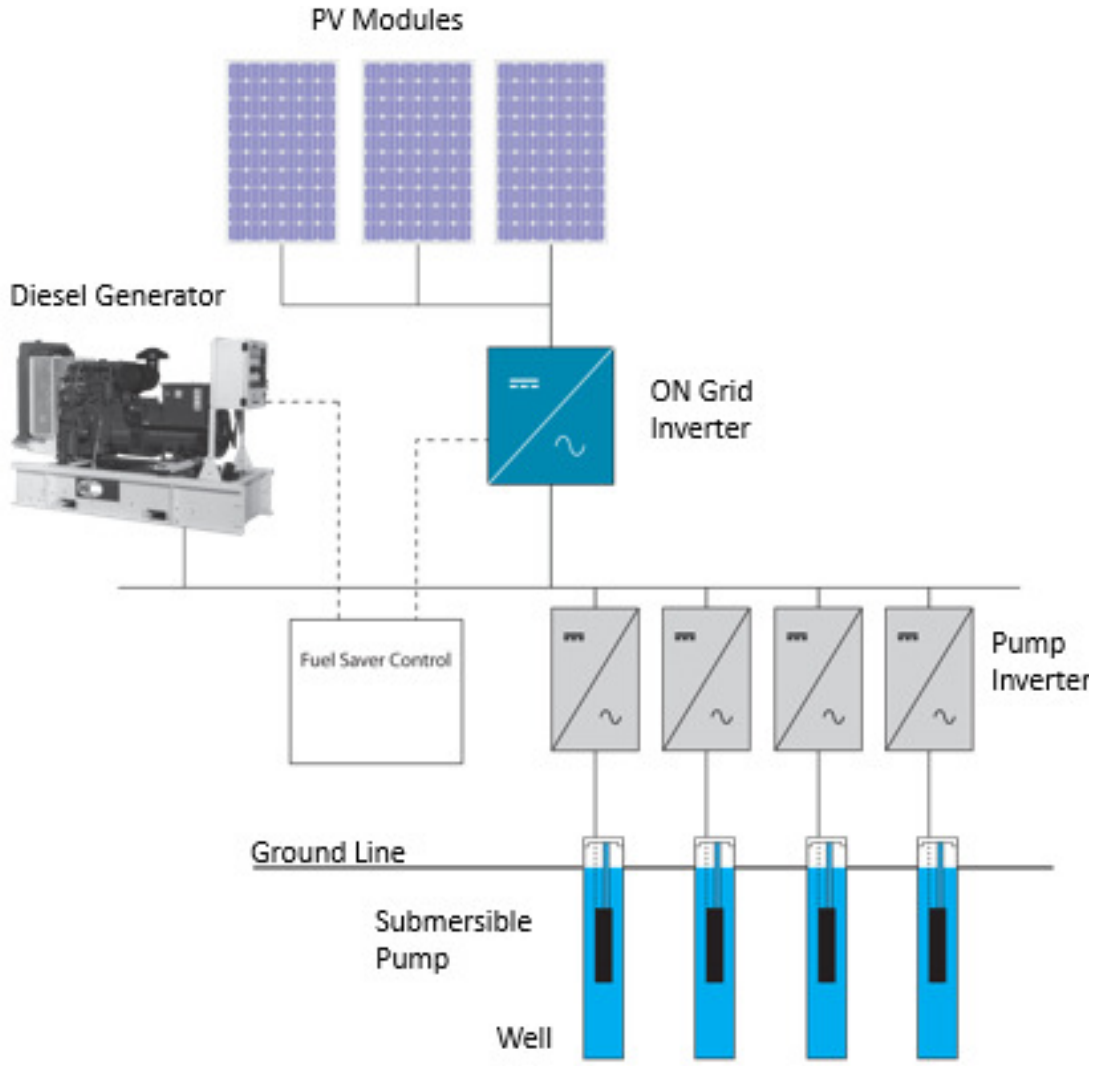


- **Direct irrigation**

Capacity Building

Large Scale:

To meet the needs of large developers at new farms or for multi developers with several wells that are connected to a centralized generator driven grid hybrid with solar system (multi-well hybrid systems).

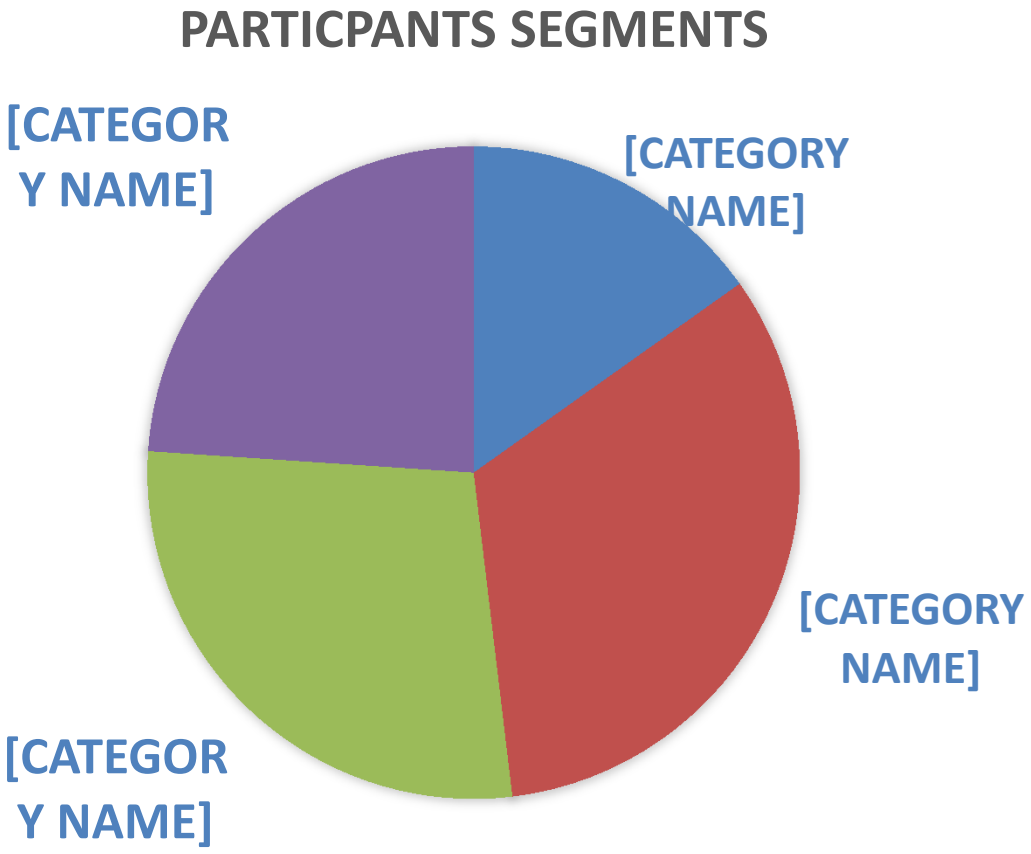


Capacity Building

Awareness raising and capacity building

Courses delivered by IAREEE based on international standards and knowhow transferred with localization on Egypt environment

Over the past three years, more than 350 engineers from different sectors have been trained



Capacity Building

Awareness raising and capacity building

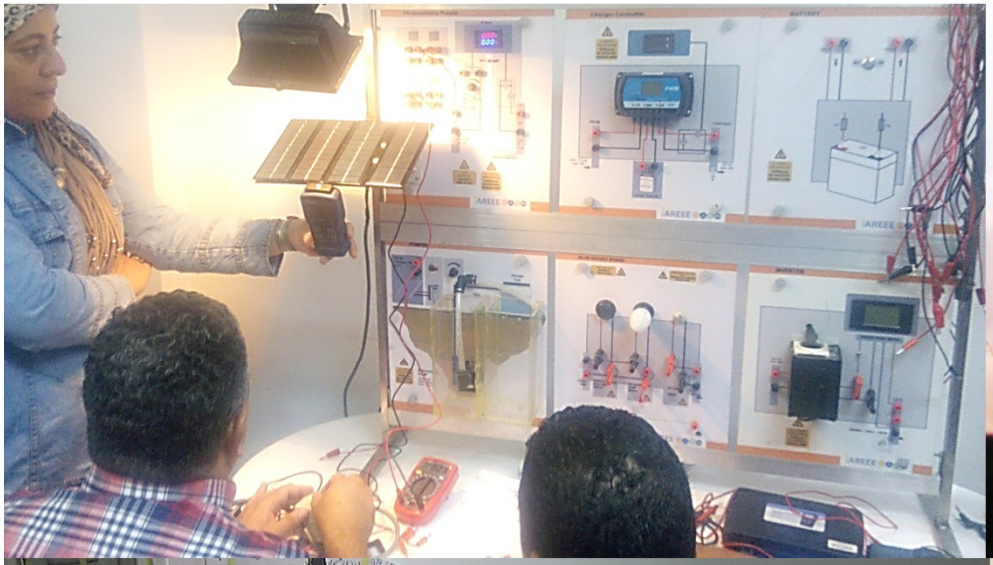
IAREEE has developed laboratory equipment's target different segments of implementation for OFF-Grid and solar pumping applications

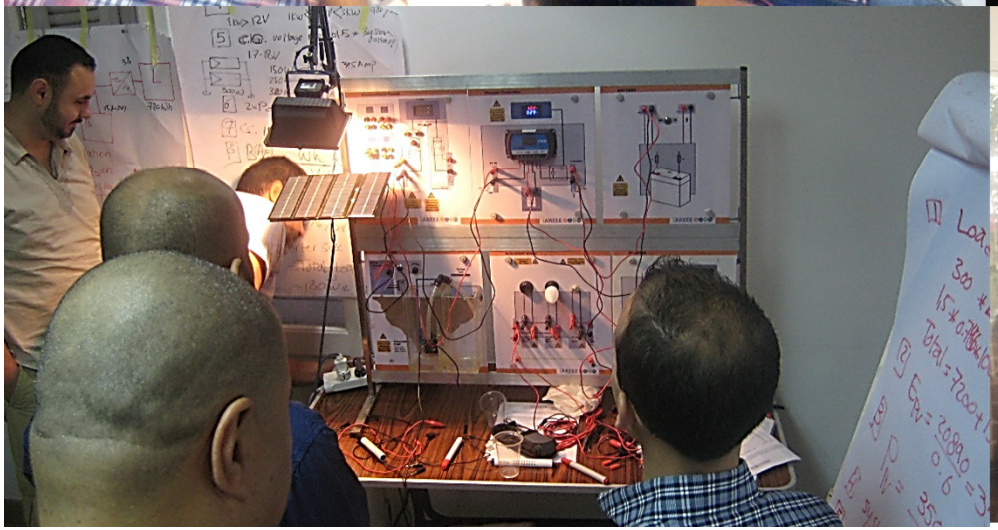
Range :

- **Off-Grid Solar PV training simulator. (Developed)**
- **Solar pumping training simulator (Developed)**

Capacity Building

Awareness raising and capacity building





Thank you

Eng. Wael Madkour
wael.madkour@iareee.com
www.iareee.com | +201005776769