



## Background

Myanmar is one of the most poorly electrified countries in Southeast Asia, with an average electrification rate of around 50%. Myanmar faces an uphill battle to achieve universal electrification. With the lowest GDP per capita in the region, the need to unleash the transformative power of reliable and sufficient energy for all becomes all the more urgent. To improve the economy, Myanmar needs to invest in ending energy poverty.

Since Myanmar embarked on economic reform and market-opening process in 2012, it has witnessed rapid economic growth along with a sharp increase in electricity consumption.

While Myanmar has tremendous solar resources and vast hydro potential, the dependency on fossil fuel generators by Small and Medium Sized Enterprises (SMEs) is very high.



An Old Diesel Generator

## Challenges

Myanmar economy has been growing fast and reliable electricity supply has become a major constraint for the growth of SMEs.

In 2019, the national grid provided only 50% of the country's electricity requirement, leaving the rest to depend on fossil fuel generators that are not only polluting but also expensive for SMEs.

Businesses in Myanmar have been relying on traditional sources of fuel such as: coal, oil and gas for generation of electricity at a high operating cost due to lack of sufficient awareness about the financial feasibility of small scale renewable energy projects.

Access to affordable finance for investment in Solar Photovoltaic (PV) systems has been a major challenge for SMEs to keep continuing their dependence on the high costs fossil fuel based power generation systems.

Recent increase in electricity tariffs since July 2019, has resulted in higher operational cost for Myanmar SMEs.



A Mini Electrification Line



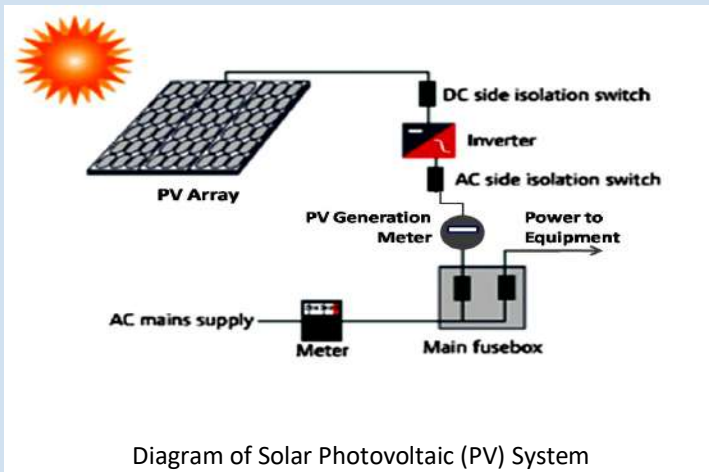


Diagram of Solar Photovoltaic (PV) System

## Description of the Responsible Technology

Solar Photovoltaic (PV) is a technology that converts sunlight into direct current electricity by using semiconductors. When the sun hits the semiconductor within the PV cell, electrons are freed and form an electric current. This DC power is converted to AC power with an inverter. There are three major types of solar panels: Monocrystalline, Polycrystalline and Thin-film.

Three main types of solar power systems are:

- **On-grid systems** are connected to the national grid without batteries, as they only supply a small part of the electricity needs of the user.
- **Off-grid systems** are not connected to the national grid and require battery storage and a back-up generator to provide electricity during nights and cloudy days.
- **Hybrid systems** combine the best from on-grid and off-grid systems, which can be described as: On-grid with extra battery storage; or Off-grid solar with utility backup power.

## Financial Benefits

The table below presents the financial benefits and pay-back period of Solar PV System.

Operational Cost of 50 kWp Million (MMK)	Off-Grid		On-Grid	
	Before	After	Before	After
Electricity Cost	N/A	N/A	15.42	7.71
Diesel Cost	25.48	13	4.1	2.05
Diesel Generator Maintenance Cost	1	0.35	0.3	0.1
Total Operation Cost	26.48	13.09	19.82	9.86
Total Saving in Operational Cost	13.39		9.96	
Total Investment for 50 kWp	87.5		87.5	
Payback Period	approximately 6-7 years		approximately 8-9 years	

## Non-Financial Benefits

- Improve SME's corporate image with customers, stakeholders and government bodies as a Eco friendly business.
- Reduce the carbon footprint, the impact of noise & smoke from diesel generators, directly improving the work environment & health of employees.
- By using solar power, SME will be freeing up electricity from the grid that can be used by other consumers, thereby expanding energy access for other industrial, commercial and residential users.

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Solar PV System Control Room



Roof-top Mounted Solar Photovoltaic (PV) Panels

## Lesson Learnt

- Proper design of the Solar PV System based on a Site Survey is essential to develop an efficient system.
- Quality of components selected is crucial in ensuring that the Solar PV System works well and effectively both at low and high electricity utilization load.
- SMEs should study their needs and negotiate the specifications, terms and conditions carefully with the suppliers to secure: good quality of service before, during and after installation; favorable prices; and proper Operation and Maintenance training support through proper Sale Contract.
- Develop proper plan and schedule for installation and operation as logistical challenges are exacerbated during rainy season.
- Ensure safety of workers on Roof Top, both at the time of installation and maintenance that align with Occupational Safety and Health (OSH Standards).