Orientation 2 – Second session

Expectations of members on the new fields of electricity
Photovoltaic Production Installations in residential

Situation in Lebanon

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- Photovoltaic Systems Solution
- Suitable Photovoltaic Systems Solution for Lebanon Case
- Inspection for a PV installation Systems in new and existing buildings
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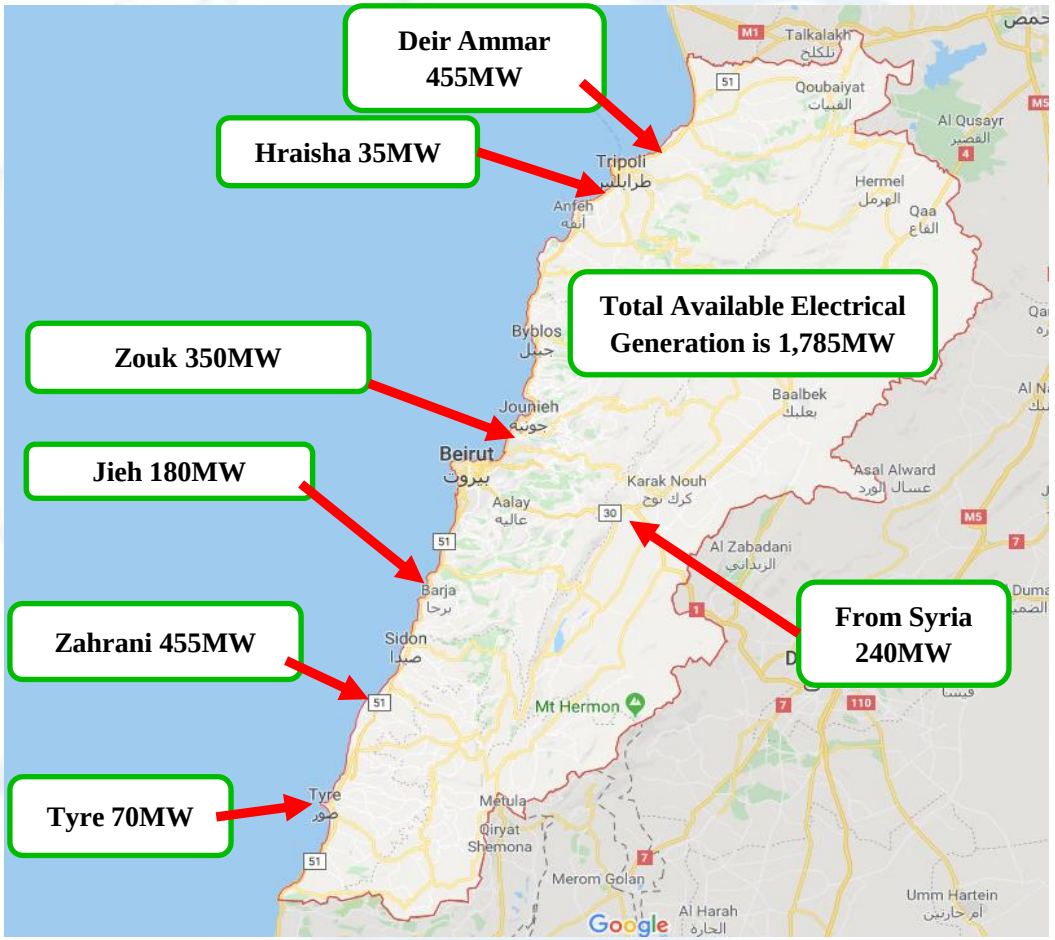
Introduction

- The state-run Electricité du Liban (EDL) has a generating capacity of about 1,800 megawatts.
- Compared with the estimated 2,000 to 3,000 megawatts the country needed before the crisis (2019).
- The economic crisis began in 2019 that has seen the Lebanese lira lose more than 98% of its value against the U.S. dollar.
- In 2022, EDL provided only around 200 to 250 megawatts, because the economic collapse means the government struggles to pay for the imported fuel used to power the country's main electricity plants.
- ***Even sometimes the grid fell down totally for days.***
- The lack of electricity and the fuel problems in Lebanon leads to:

« a surprising solar power boom »

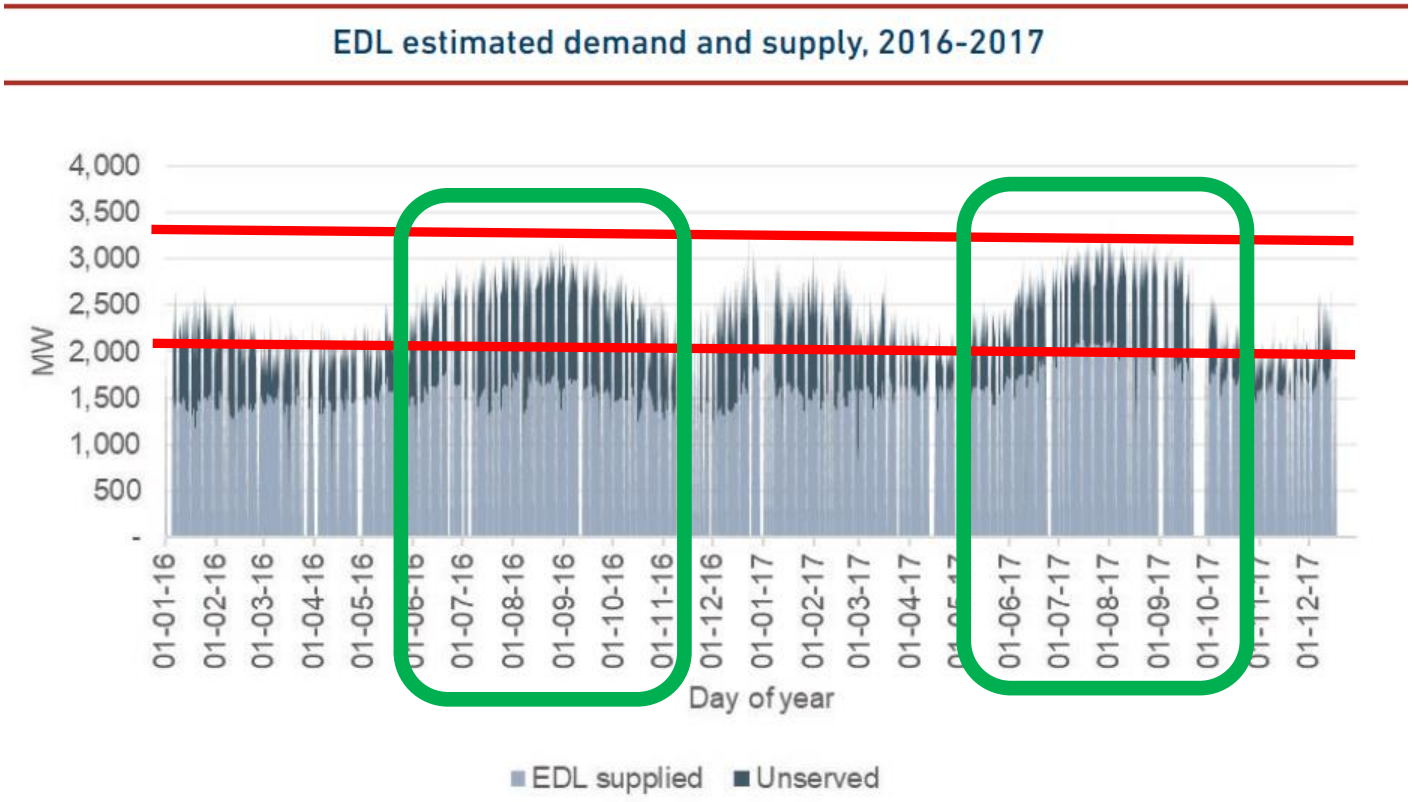
The Situation in Lebanon

- According to the updated policy paper for the electricity section; (Ministry of Energy and Water - March 2019)



The Situation in Lebanon

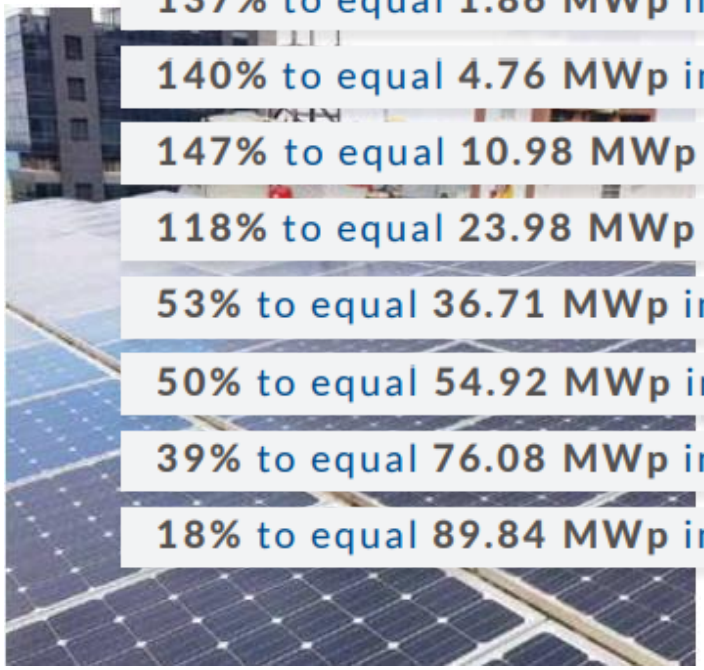
- According to World Bank Group: Lebanon Cost-of-Service and Tariff Design Study (May 2020)



02 In 2010, Lebanon's solar PV installed capacity equaled **330 kWp.**

The installed capacity increased by:

- **43%** to equal **470 kWp** in 2011
- **68%** to equal **790 kWp** in 2012
- **137%** to equal **1.86 MWp** in 2013
- **140%** to equal **4.76 MWp** in 2014
- **147%** to equal **10.98 MWp** in 2015
- **118%** to equal **23.98 MWp** in 2016
- **53%** to equal **36.71 MWp** in 2017
- **50%** to equal **54.92 MWp** in 2018
- **39%** to equal **76.08 MWp** in 2019
- **18%** to equal **89.84 MWp** in 2020



03 From 2010 until the end of 2020, the cumulative installed solar PV capacity grew by an average rate of **81%** per year.

04 The solar PV electricity generation in 2020 represented **1.03%** of the total annual electricity generation by EDL (compared to **0.73%** in 2019).

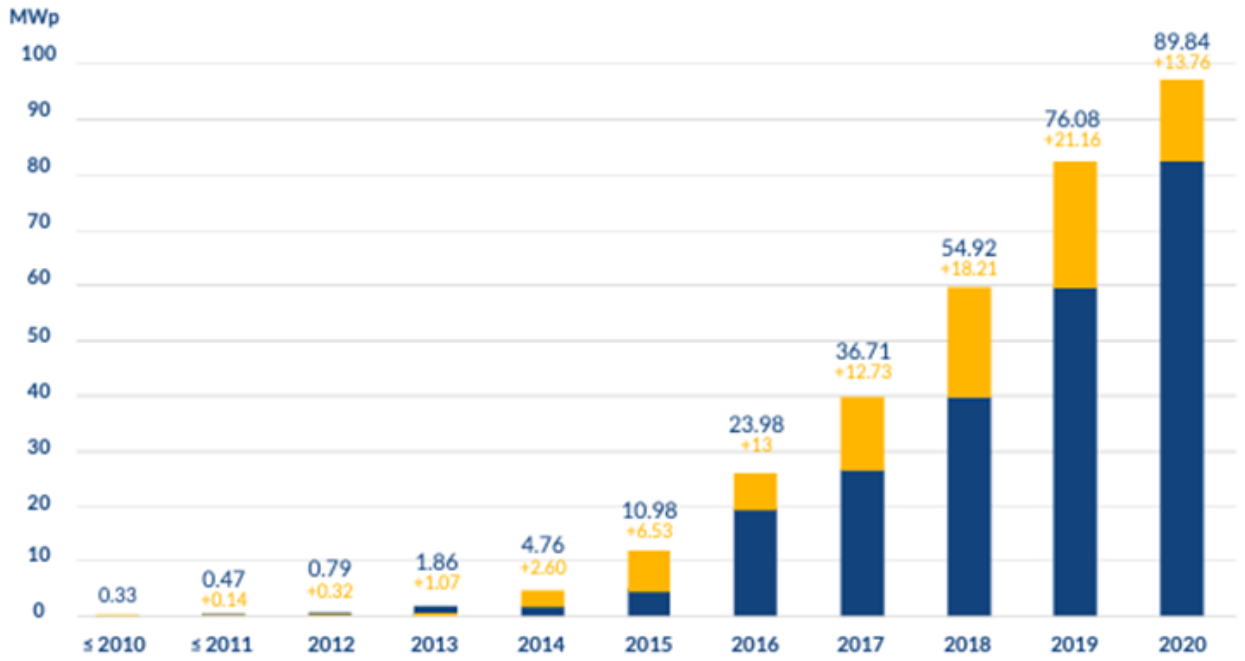
05 The total investment in the solar PV sector up till the end of 2020 reached **$135.19 Million.**

06 The number of new solar PV projects per year increased from **25** in 2011 to **313** in 2020.

The Situation in Lebanon

SOLAR PV CAPACITY AND ANNUAL ADDITIONS

Installed capacity of solar PV increased from 0.33 MWp in 2010 to 89.84 MWp in 2020, which constitutes around 90% of the NREAP target for decentralized solar PV installations by 2020.



The Situation in Lebanon

- 2019 Lebanon demand is 3,669MW
- Generation represents 48.6% of the required load.
- This 48.6% can only be used under full operation of the available plants

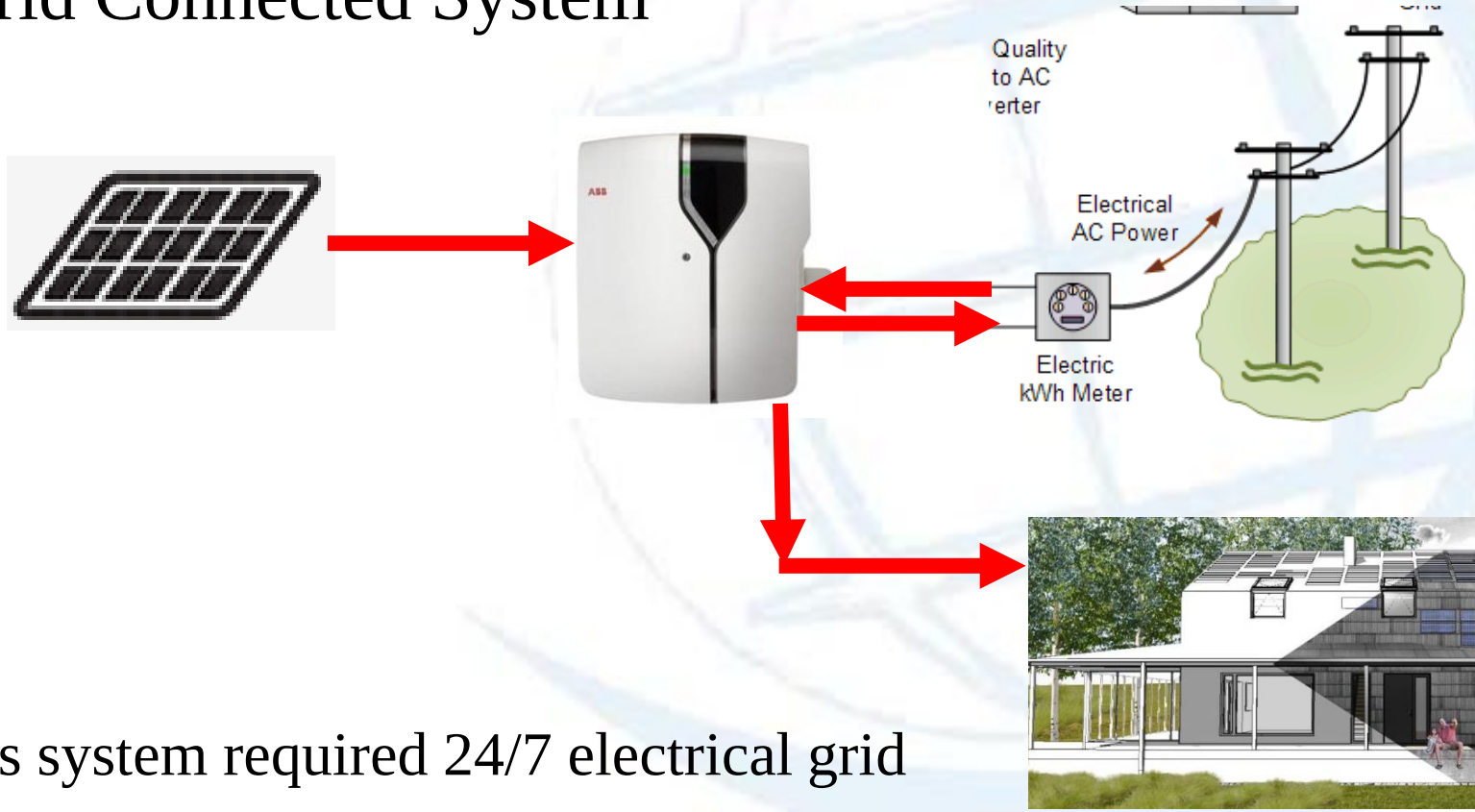
- In addition to the high gap between Generation and Consumption, Lebanon was hit with severe financial problem that prevented its Government from supporting the required fuels for the existing plant operations

The country saw a rapid capacity increase to **1000 MW** in June 2023

Solar energy capacity has taken up 30% of conventional electricity

Photovoltaic Systems Solutions

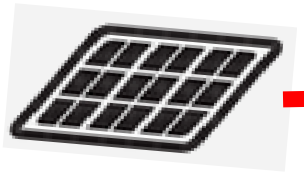
- Grid Connected System

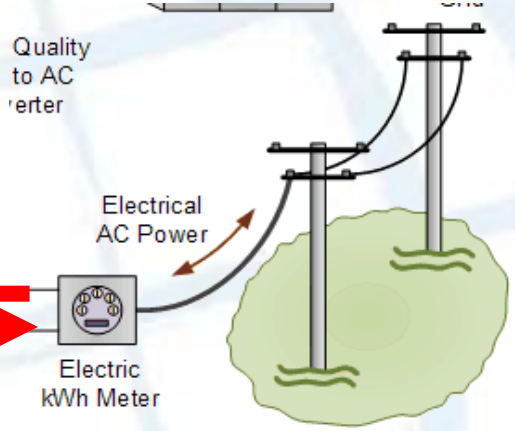


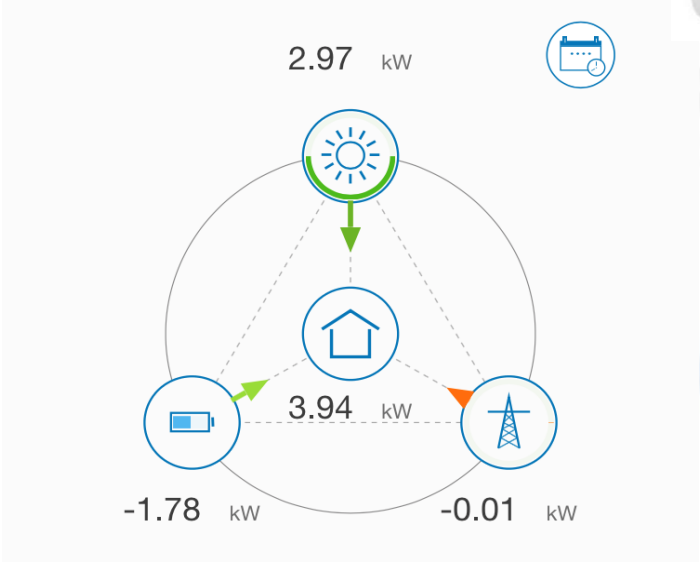
- This system required 24/7 electrical grid

Photovoltaic Systems Solutions

- Hybrid Grid Connected System



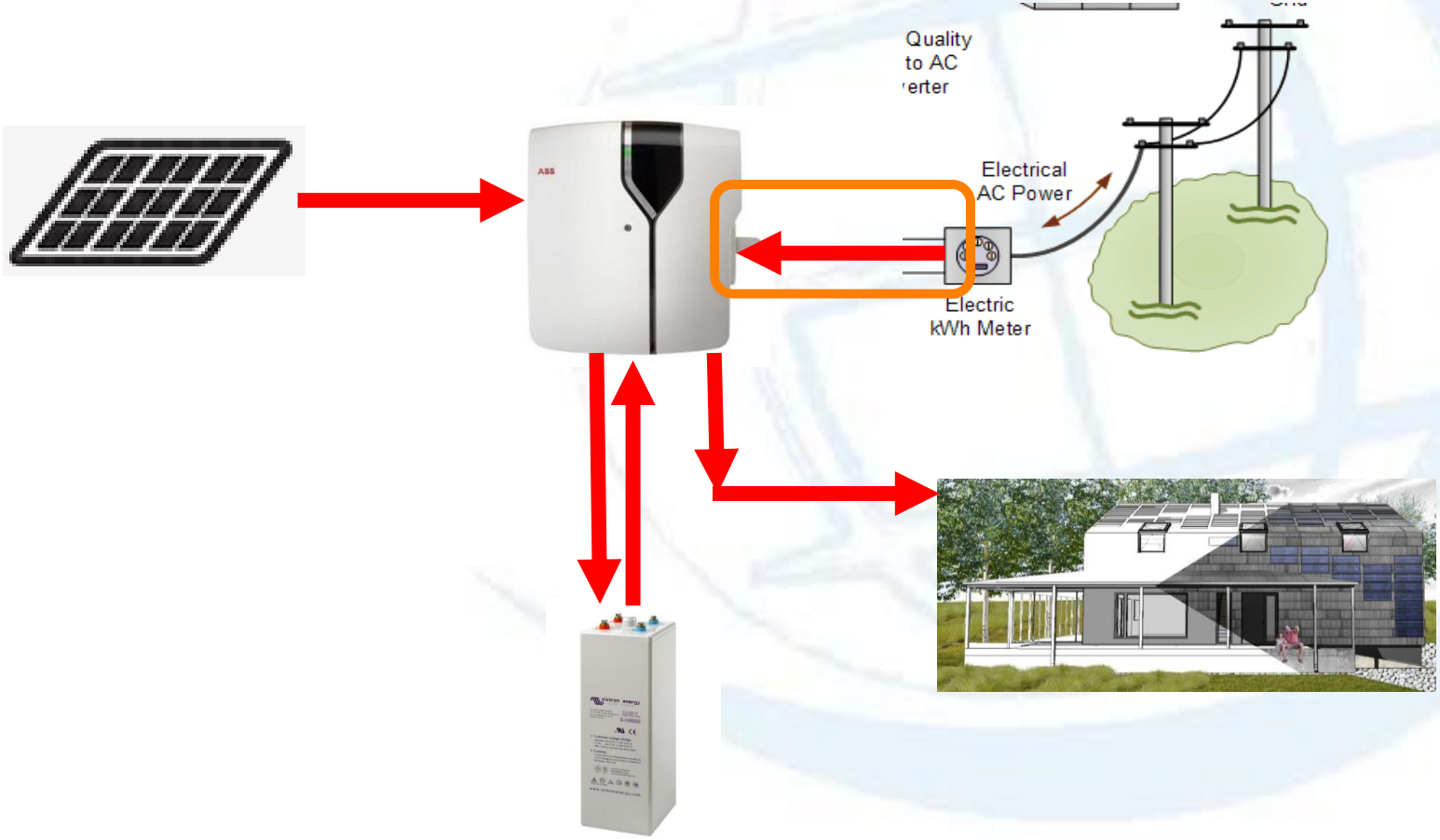




includes an
energy storage

Photovoltaic Systems Solutions

- Hybrid Grid Connected System (No injection)



Photovoltaic Systems Solutions

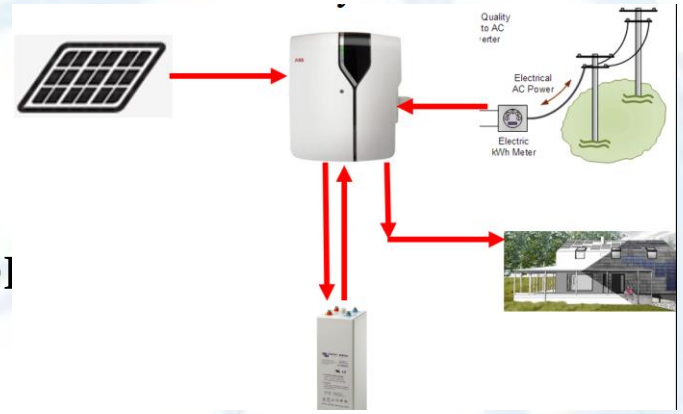
- PV Grid Connected System (No Injection & No Batteries)

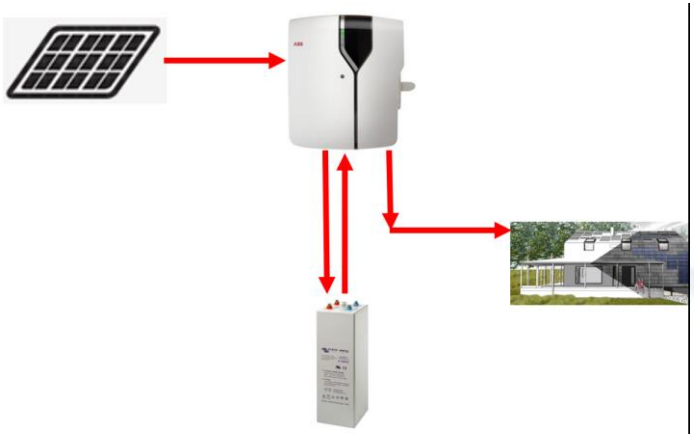
Photovoltaic Systems Solutions

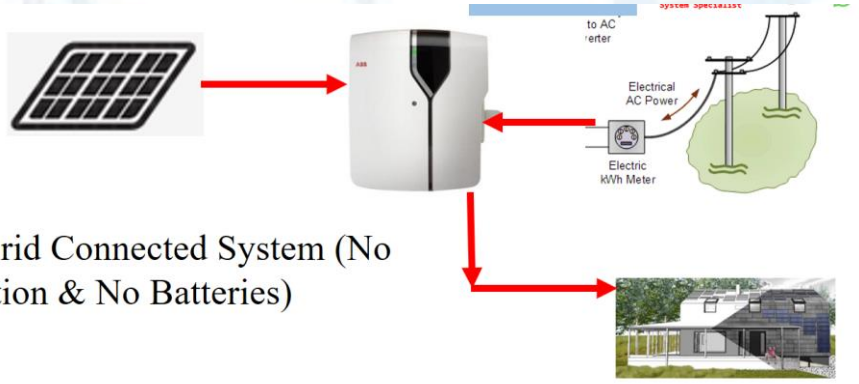
- Off Grid System

Suitable Photovoltaic Solution for Lebanon

- For Lebanon, currently the most suitable systems are:
  - Off Grid System
  - Hybrid Grid System (No Injectio







n PV Grid Connected System (No Injection & No Batteries)

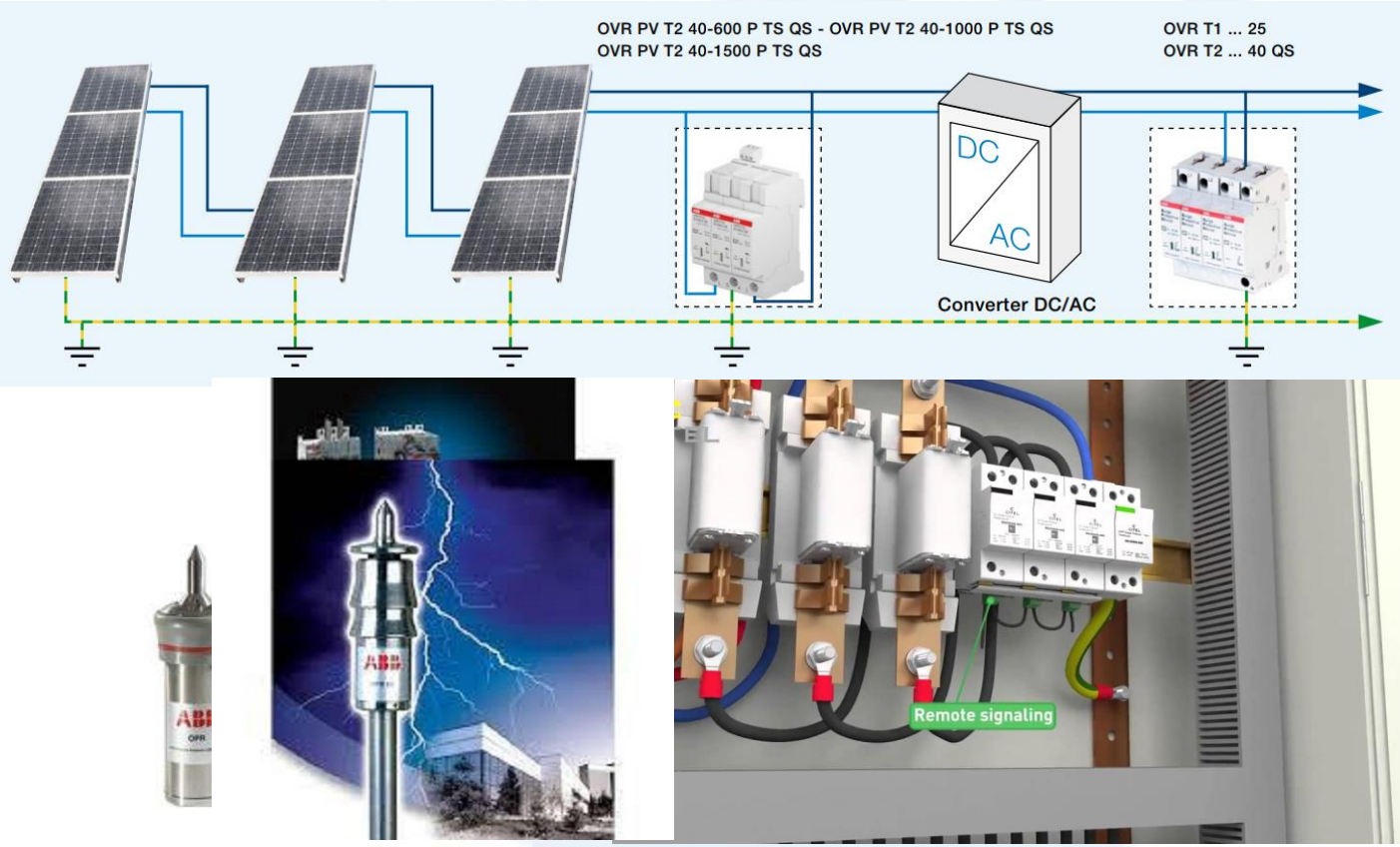
Inspection of PV system

Inspection covers the following sections:

1. Supporting Structure
2. PV Panels fixing, orientating and tilts
3. Inverter location, type and mechanical protections
4. Wiring complaints to standards (size, location, mechanical and electrical protections, etc…)
5. Battery types, locations, mechanical and electrical protections

Inspection of PV system

- PV installation on the roof exposes the entire electrical building to lightning which could cause major damages and fires



Anomalies Situation Observed

- Low quality equipment with high failure rates
- No remote testing is allowed
- No clearance to meet standards
- Cable sizing and layout
- Sizing of the system to meet the required load
- No qualified personal is completing design and installation
- Energy storages are not ventilated, nor it is located in a ventilated area

Discussions

- Discussions/Questions?