Whitepaper

Case study-780kW solar storage system improves profit for the garment factory

Background

Years of war has severely damaged Cambodia's power sector, the inducing high electricity price and low energy access has closely impacted local factories' production capacity, profit etc. One garment factory there used to rely on a 400KVA power grid transformer, yet the whole factory peak load was 600KW, so the diesel generator had to be turned on when load capacity exceeded 400KW. Extra high expense and pollution caused by the generator are also headaches. To resolve such problem and maximize production profit, owner of the factory opted to utilize their abundant light resources, to retrofit his existing power system to an ATESS integrated solar energy storage system.

Site Survey	
Site location	Cambodia
Grid condition	Stable
Load	600kW
PV installation	780kWp
Daily Consumption	5000kWh
Electricity Price	0.2 $ /kWh
Equipment installation	Indoor

System Design

According to the actual site condition, the total installed PV panel is designed to be 780kw. Three 250KW solar charging controllers ATESS PBD250 and one 630KW Bi-directional ATESS PCS630 are selected for the client. Each PBD250 is built with 5-input 50KW independently controlled MPPT modules, and each MPPT can be connected with a 16-input PV junction box, which is connected with 10 panel strings. The final PV configuration is 13 strings and 150 strings parallel.

Configuration

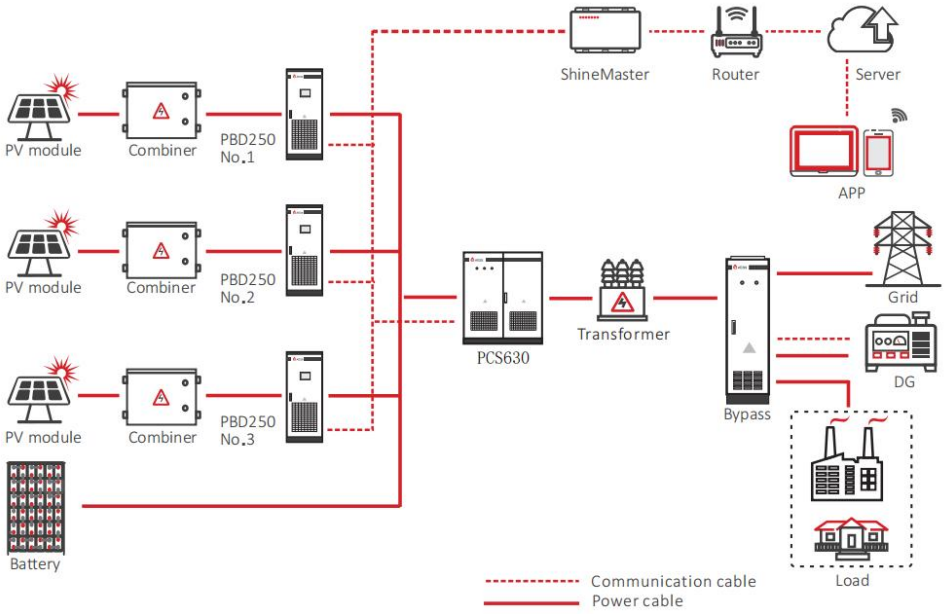
System configuration		
Item	Capacity/Qty.	Description
PV Panel	780kW	TSM-400DE15M(II)
Lead-acid battery	1622.4kWh	2V 1200Ah 338 in a string， 2 strings parallel
ATESS PBD250	3	250KW solar controller
ATESS PV-CB16M	15	16-input PV combiner box
ATESS PCS630	1	630KW Bi-directional
ATESS Isolation Transformer	1	400/400 630KVA
ATESS Bypass630	1	630KW bypass cabinet， switchover time 10ms
ATESS ShineMaster	1	Data logger
ATESS Enercloud	1	Monitoring Cloud Platform

Operation mode:

(1) When PV power exceeds the load power, PV will supply preferentially to load , and the remaining electricity will be charged to battery;

(2) When PV power doesn't meet the load requirement, battery will discharge automatically. When battery is discharged to the undervoltage protection point, PV and power grid will supply load together. In order to protect the battery, small power energy will be used to trickle charge the battery to a certain extent, the power supply then can be restored.

(3) Off grid mode: when the battery is discharged close to the undervoltage alarm point, PCS will send a dry contact signal to start the generator and it will supply power to load; When battery is charged to the floating charge point, PCS sends a dry contact signal to shut down the diesel generator.



System Revenue

The system capacity is 780kwp, average daily solar irradiation time is about 5.225 hours, system efficiency is around 75%, and the efficiency of PV modules decays by 0.8% every year. We can estimate the power generation and corresponding revenue within 5 years as the following:

Estimated annual output of 780kwp Cambodian garment factory power station						
Year	System capacity (KW)	System efficiency	Decay rate	Irradiation duration (h/d)	Annual power generation (kWh)	Equivalent electricity cost(USD)
1	780	75%	1	5.225	1115668.125	223133.625
2	780	75%	99.2%	5.225	1106742.78	221348.556
3	773.76	75%	99.2%	5.225	1097888.838	219577.7676
4	767.56992	75%	99.2%	5.225	1089105.727	217821.1454
5	761.4293606	75%	99.2%	5.225	1080392.881	216078.5762

According to the rough estimation in the above table, in the first three years of operation, the system can help to save equivalent 664059.9486 US dollars of

electricity cost, the overall initial investment of this energy storage power station is about 650000 US dollars. Thus we can see that the initial investment can be recovered after three years of operation, and from the fourth year, they system can start saving electricity expenses for the owner.

System Overview

With the features of easy installation and user-friendly GUI, the system installation has been completed and running smoothly ever since September 2020. Until now, the diesel generator hasn't ever been turned on and the power generation is stable. The factory owner is happy about ATESS products and our professional engineer team. What makes him most satisfied is that, he can monitor the system operation in real-time through our cloud platform Enercloud to implement system maintenance. If the system fails, ATESS service center can also check and clear the fault through Enercloud.

Keeping in mind our new energy mission, ATESS will deliver many more clean energy to all over the world, to help more people in need with power difficulties.