Energy Storage System (ESS) for Building Energy Management

Public Works Design Forum (PDF 2018)
9-10 Julai 2018

Cawangan Kejuruteraan Elektrik

Energy scenario

Renewable Energy

Increase in power generation capacity

Reduces dependencies fossil-fuel based power plant

Clean energy, reduces Green House Gasses

17% of Renewable Energy in 2030

Energy scenario

Power quality

Increase share of RE

Intermittent

Sustainability

Balance in supply

Energy Security

Cost effective

Reliability

Power outage

Stability in power distribution & transmission

Energy Storage System (ESS)

Supportive source of power

Batteries, hydro, thermal, capacitor, flywheel, hydrogen & etc.

Consumer

Boost the supply at peak periods (peak shaving)

Backup in case of emergencies

Utility

Smoothing intermittent Renewable Energy power flow

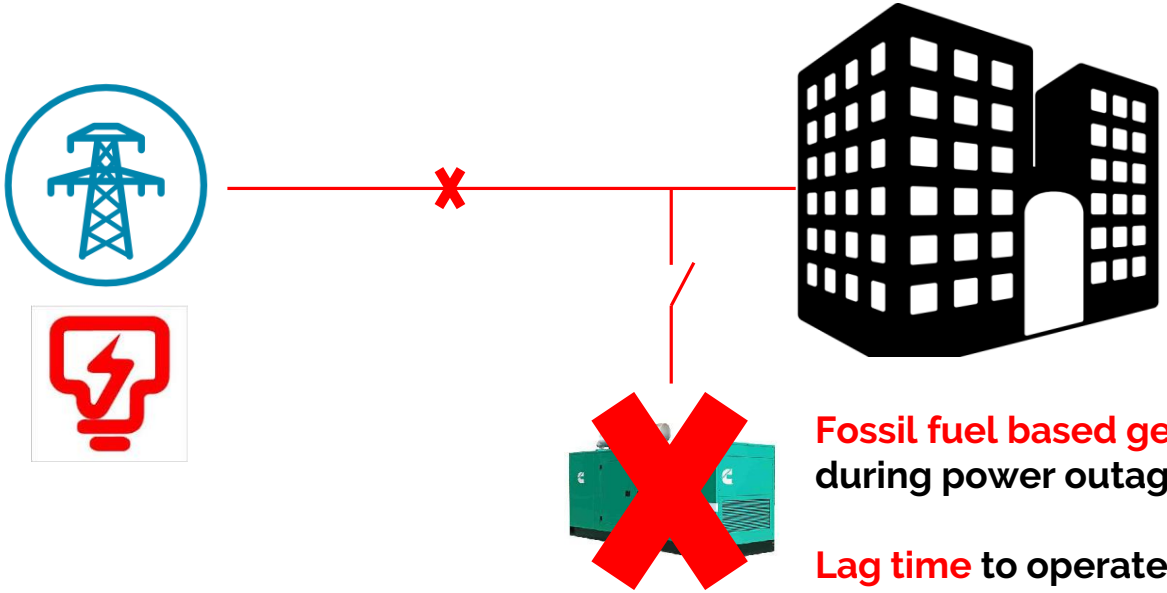
Regulate frequency

Voltage control

The 100 MW lithium-ion energy storage system by TESLA. The largest ESS in the world

Source: Energy Malaysia,Vol. 14, 2018

Energy Storage System (ESS) for Building Energy Management



Fossil fuel based generator as backup during power outage

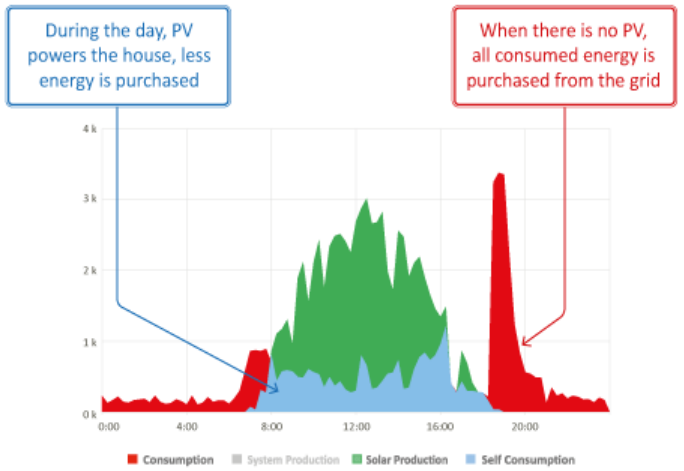
Lag time to operate

Environmental issue – **Carbon gasses**

Energy Storage System (ESS) for Building Energy Management

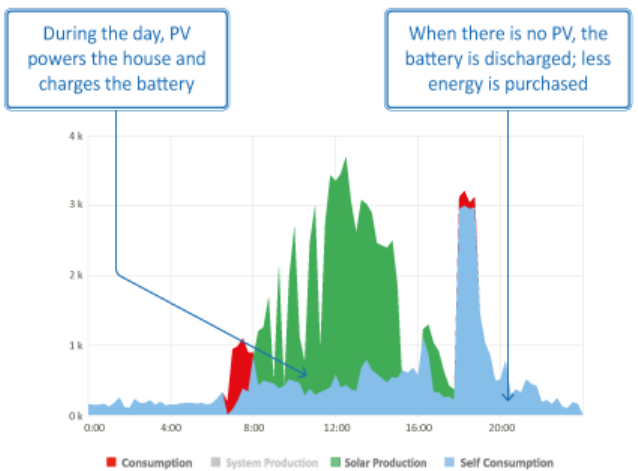
Typical 4KW System Before Battery Installation

Total produced energy	Total consumed energy	Self-consumed energy	Total purchased energy	Electricity bill saving
18.19 kWh	12.15 kWh	5.63kWh	6.52 kWh	46%



Typical 4KW System After Battery Installation

Total produced energy	Total consumed energy	Self-consumed energy	Total purchased energy	Electricity bill saving
18.26 kWh	12.40 kWh	11.41kWh	0.99 kWh	92%

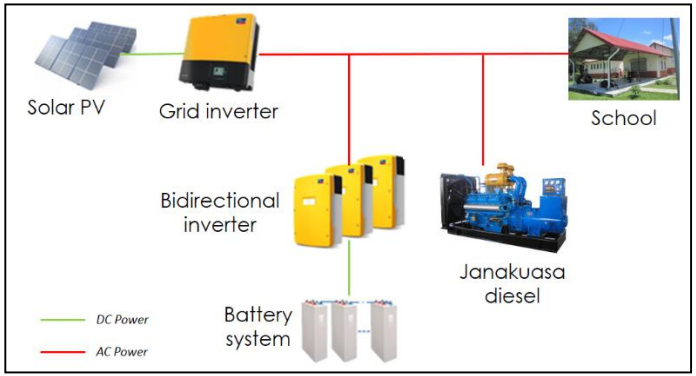


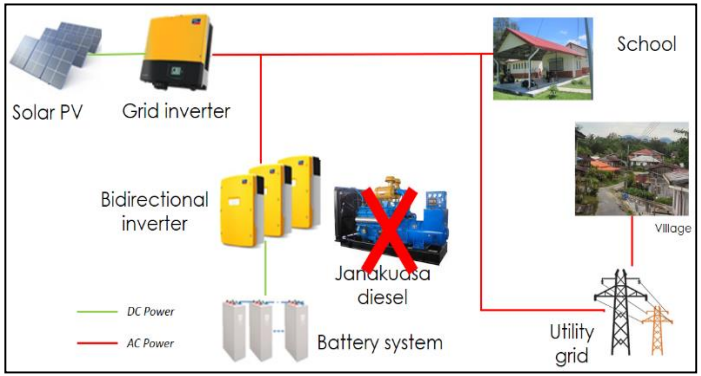
Source: empowerenergy.co.uk/battery-storage/

A case study on ESS

JKR has taken proactive action in realizing the potential of ESS to ensure uninterruptible power supply for the government building.

An existing off-grid solar PV system was selected – SK Matupang, Ranau to demonstrate & evaluate ESS performance

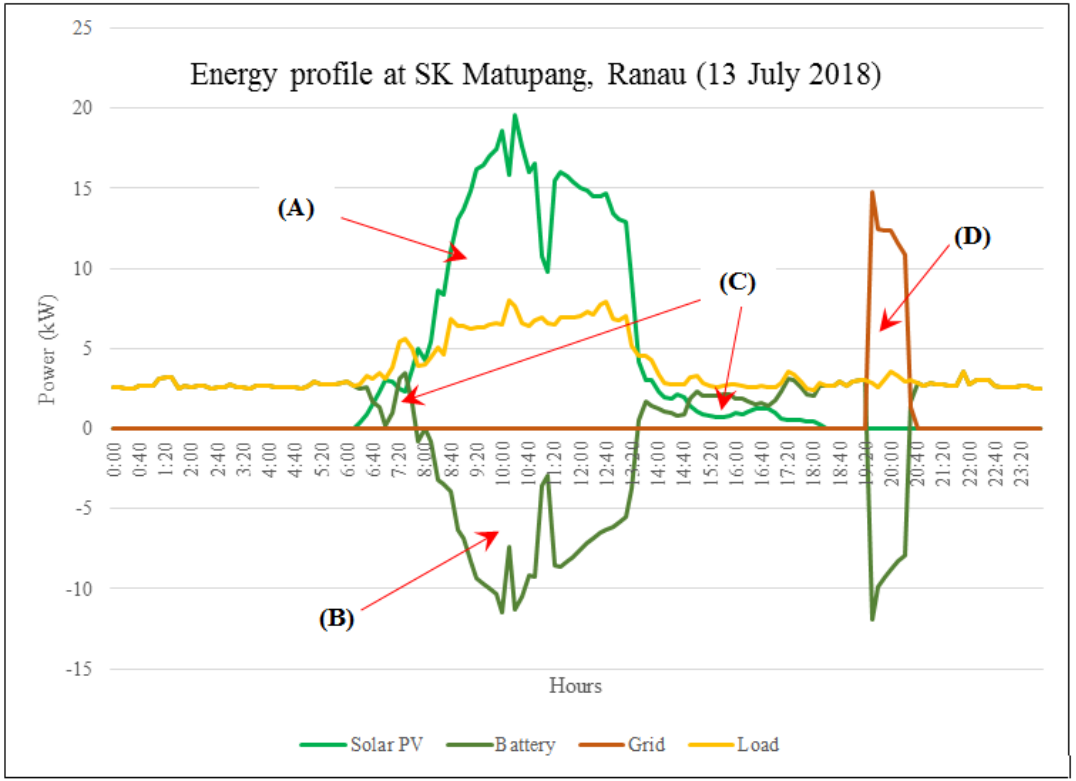




Before: Off-grid solar PV with diesel generator

After: Grid connected solar PV with ESS

A case study on ESS



(A) Electrical power generated from the solar PV panels. The power was generated based on the requirement from the load of the school buildings.

(B) Excess energy from the solar PV panels was stored into the ESS (battery)

(C) In the event of low power generated from the solar PV panel that not sufficient to meet the load demand, the ESS discharged its energy to compensate the deficit.

(D) The power from the grid provided stability and balance to the system for several hours when required.

Conclusion & Recommendation

The Energy Storage System (ESS) shall be looked as a potential method and solution in mitigating the instability of power supply from the grid

Useful for any Building Energy Management

JKR can play their role in ensuring that the building electricity service is highly reliable, low interruptible power supply and cost-effective

Thank You