Konference
Energetické Rušení 2024
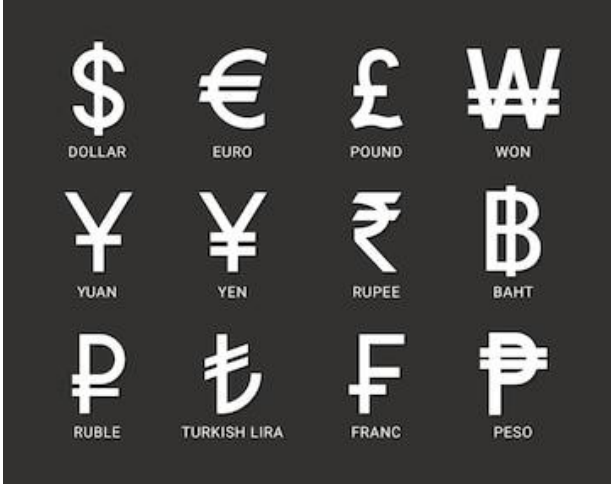
Metering Solutions for BESS

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Introduction: Market demand

BESS – Battery Energy Storage Solution

The global energy storage market size reached approximately USD 51 billion in 2022 and is projected to hit around USD 170 billion by 2032.

What is BESS?

BESS is an acronym for Battery Energy Storage System.

BESS enables energy (electricity) from different sources (renewable and non-renewable) to be stored in rechargeable banks of batteries and then release or retrieve such power when needed (prevent blackouts/brownouts, peak demands, grid balancing, etc.)

In order to perform the right way, these solutions also need a control system called Power Plant Controller (PPC) in order to connect to the grid.
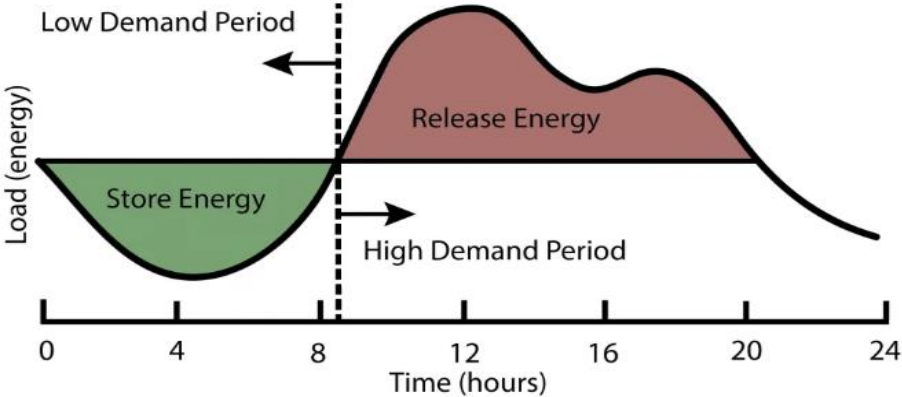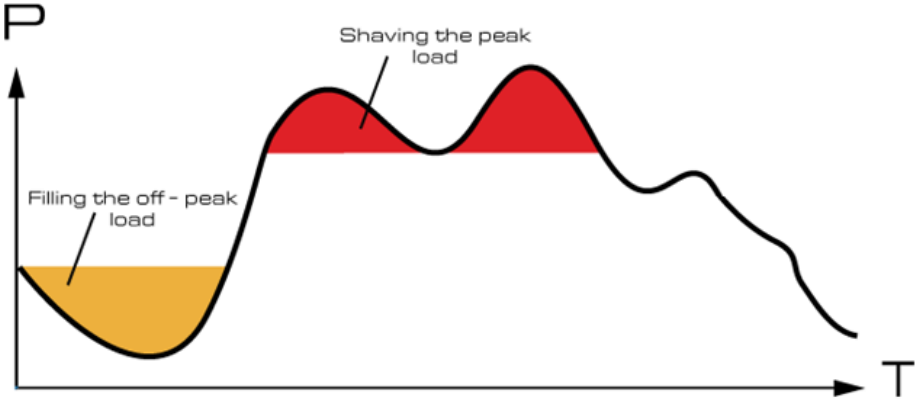
Who need BESS?

➢ Energy producers (PV, Wind, Thermal, etc).

➢ Grid operators (DNO / TSO).

➢ C&I electricity consumers.

➢ EV Charging Stations.

➢ Smart homes.

BESS offers for all of them cost effective solution.

BESS Applications

1. Peak shaving

2. Energy Time Shifting / Arbitrage.

3. Frequency Control (Grid Support)

4. Renewable capacity firming

5. Transmission Congestion Relief.

Center for Sustainable Systems, University of Michigan.
2023. "U.S. Energy Storage Factsheet." Pub. No. CSS15-17.

Battery Energy Storage System Components

Inverter / Power Conversion System (PCS).

DC/DC coupler.

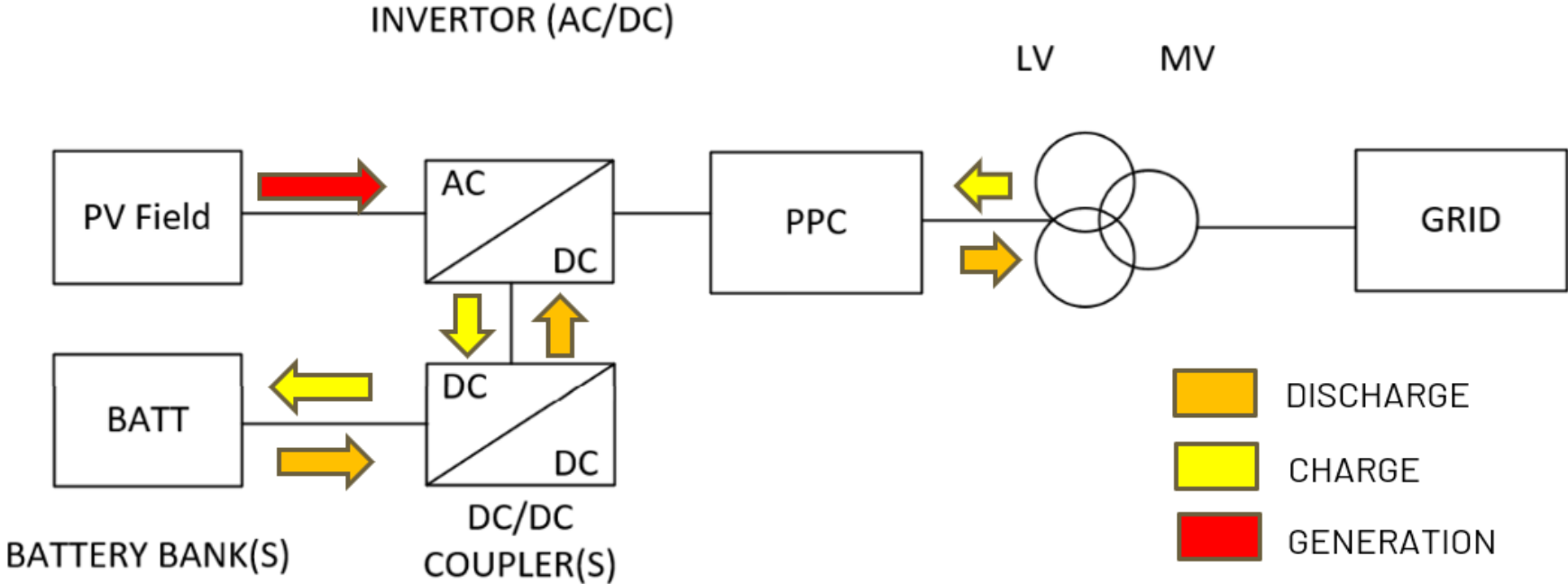Battery bank(s).

Battery Management System (BMS).

Safety System.

Power Plant Controller (PPC)
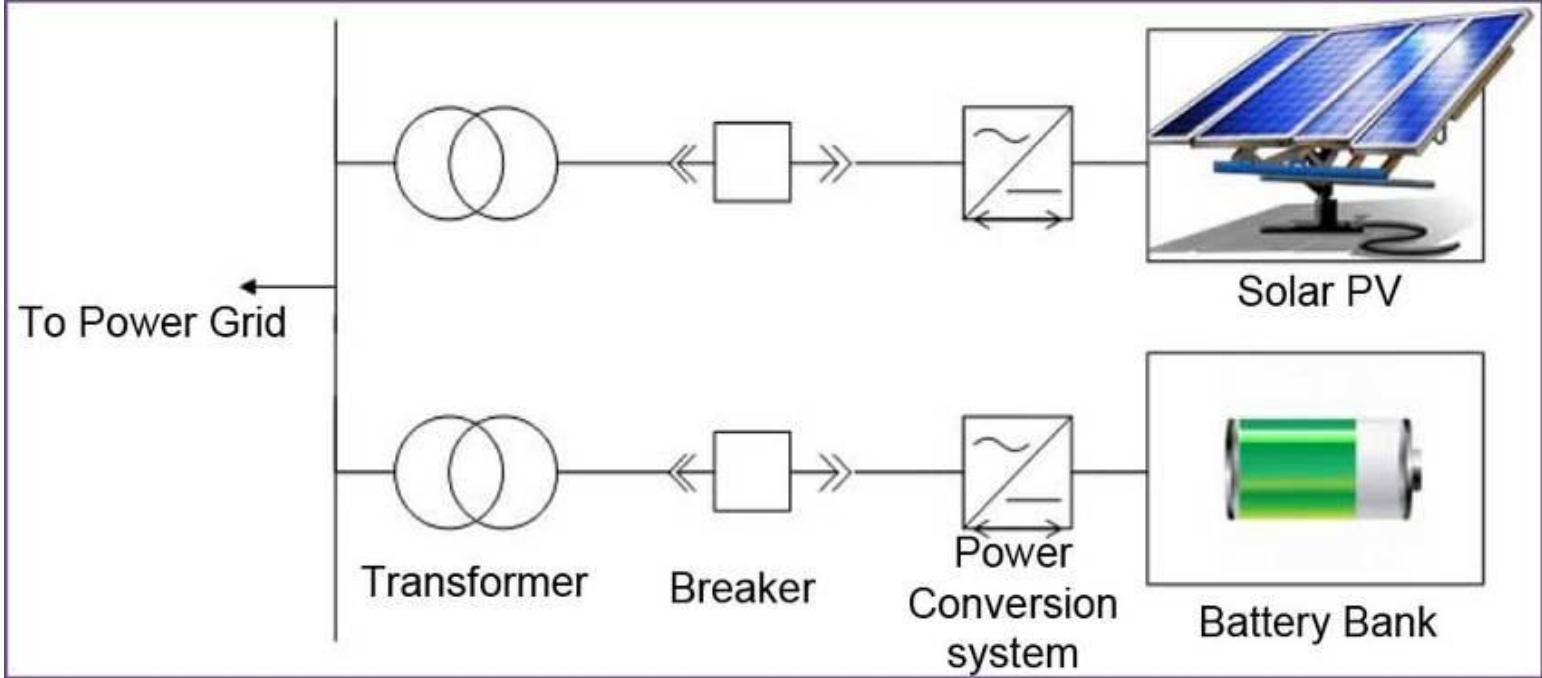
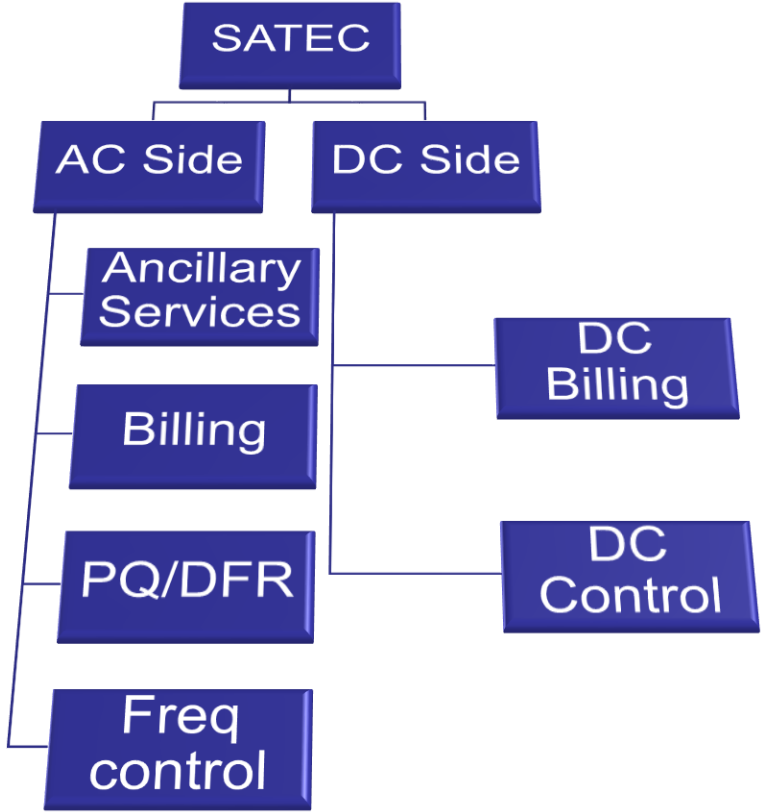# BESS architecture block diagram

Hybrid connection (DC Link)

BESS architecture block diagram

Parallel connection (not popular)

Metering solutions for BESS

SATEC Metering solutions:

➢ AC Side:
- ☑ Billing
- ☑ PQ/DFR
- ☑ Frequency control
- ☑ Export Limitation

➢ DC Side:
- ☑ Control
- ☑ Billing

Billing meters/fiscal

Billing Meters.

Fiscal / Revenue meters – all parties must understand detail how much energy passes in and out of the BESS. This meter must be approved for commercial billing in the relevant local market with a required accuracy of at least 0,5s or 0,2s, being capable of metering in 4 quadrants with TOU and energy profile recording.

Settlement Application: Grid support (AFC/FCR/FCAS)

Grid support and ancillary services: The reliability and stability of the grid is the most important aspect that should interest us. The PQ or even price of electricity fades out when system failures leave large areas without electricity. Frequency is a key parameter that reflects the balance between demand and generation.
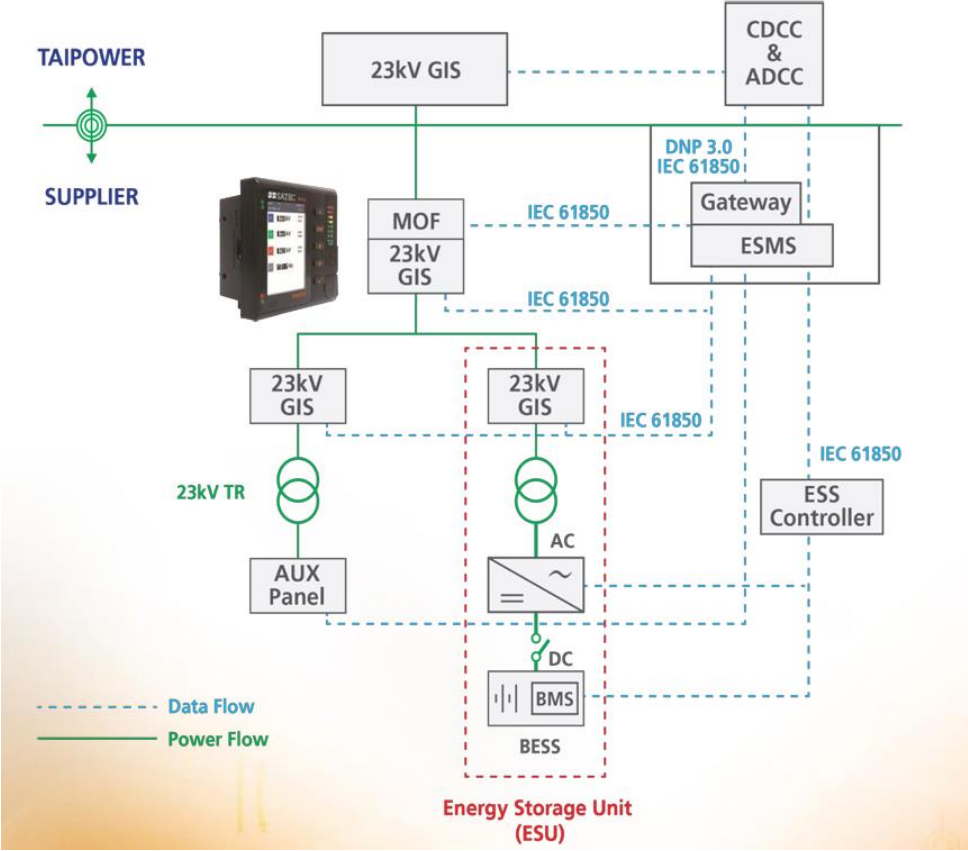
DC Metering: Standards and Technologies.

Standards – IEC 62053-41:2021

Electricity Metering Equipment – Particular requirements – Part 41 : Static meters for DC energy (classes 0,5 and 1).

Directive 2014/32/EU

Measuring Instruments (MID).

Standards - EN 50470 – 4:2023

Electricity Metering Equipment. Part 4: Particular requirements – Static meters for DC active energy (class indexes A, B and C).
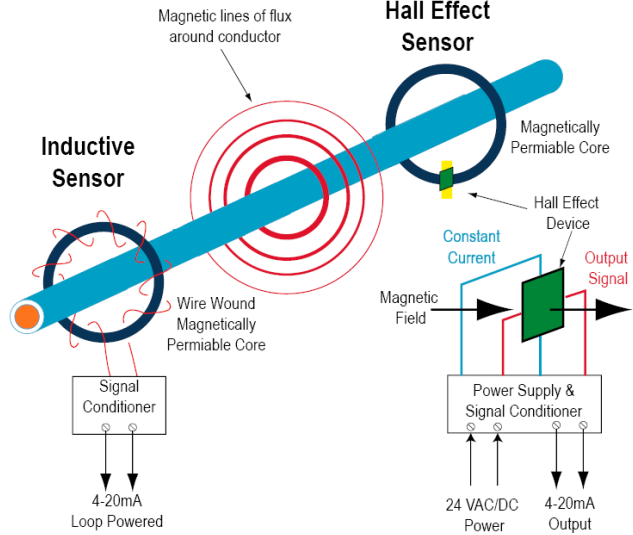
DC Metering: Standards and Technologies.

Hall Effect Sensors (HES).

In direct measurement.

Measures the strength of the magnetic field to determine how much current is flowing.

Is an active sensor that uses a power supply. The power supply is connected to the hall effect sensor, enabling a constant current flow through it.
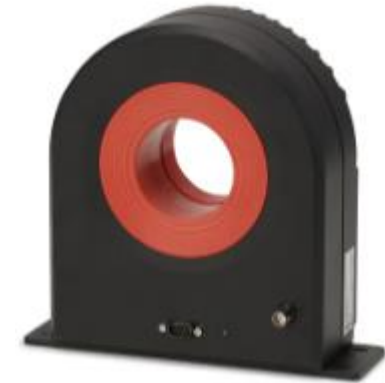
DC Metering: Standards and Technologies.

Technologies: Flux Gate Sensors.

In direct measurement.

The fluxgate current sensor uses the non-linear relationship between the magnetic induction intensity and the magnetic field intensity of the high magnetic permeability core in the measured magnetic field under the saturation excitation of the alternating magnetic field to measure the weak magnetic field.

More accurate than Hall Effect Sensors.

Thank you for your attention