Train Charging Stations

Electrification of railways is an essential step of the energy transition process towards a greener mobility.

The use of electric trains with batteries (BEMU – Bettery Electric Multiple Units) is a recent trend that allows for the electrified operation of secondary sections of the railway network, with lower traffic density, where the installation of traditional overhead lines solutions is not economically justified. An extremely important option, since charging through overhead line segments allows for the same trains to operate on sections that are already electrified.

Efacec, as a key player in the mobility infrastructure market fully committed with sustainability and the energy transition process, is now offering a new type of solutions to contribute for the decarbonization of the railways: Charging Stations for BEMU trains.

The concept

Provide an infrastructure to charge BEMU trains while standstill at the turnaround stations

Charging: 25kV AC through short overhead line segments

Short Charging Time: 10 min

Application: secondary lines with reduced traffic density and service length around 100km

Benefits

Promotes the replacement from diesel to electric operation.

Avoids the need to build and maintain a overhead contact line system on those lines, which otherwise may be economically unreasonable to move to electric operation.

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Solution

Power supply from electrical network. Stations on these types of lines may be located in areas with limited access to high voltage grid. Feeding the charging stations from MV grids puts challenges on the power quality at the interconnection (phase imbalance and harmonic distortion) due to the power required (some MW) and the singe phase loads.

Challenges

The passive, transformer based, solutions for typical traction substations are not applicable due to the restrictions imposed by the MV feeding points.

A solution based on active equipment, power converter, has to be used to avoid impacts on the MV grid power quality.

References

MIDTJYSKE JERNBANER — Lemvig
- 2 x 2.2 MVA
- Overhead Contact Line 25 kV (3 tracks)
- Workshop Charging 1 kV
- Power supply to Bus & Car Charging
- Solar Panels with Battery Storage (future)

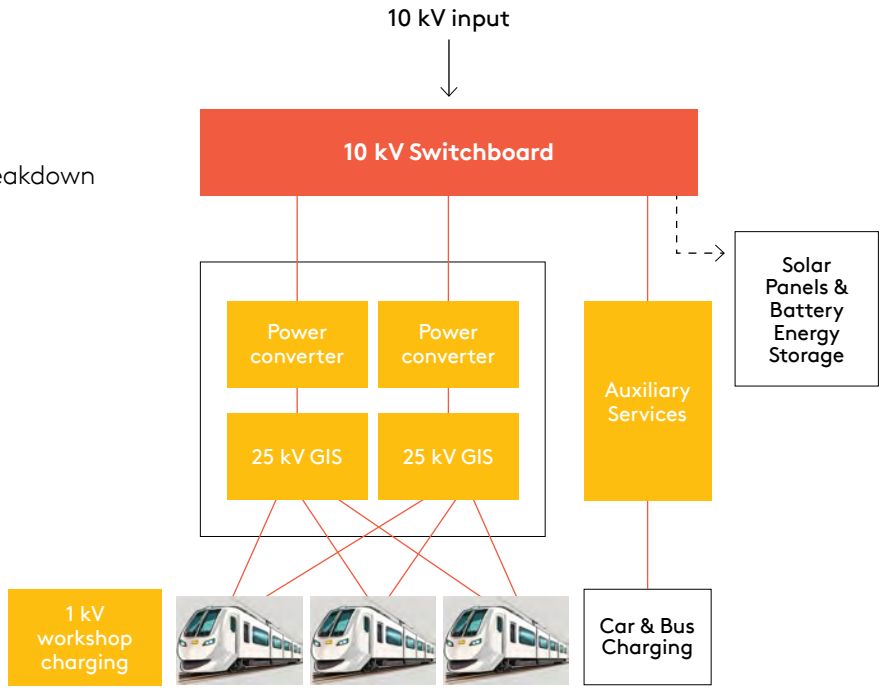
BANEDANMARK — Holstebro & Skjern
- 1 x 2,2 MVA each
- 10 kV urban grid power supply
- train charging at 25 kV, 50 Hz

Architecture example

Lemvig — Charging Station Solution
- Energy Hub for Electric Mobility
- Simultaneous Charging on 2 tracks
- 50 % charging capacity availability during breakdown or maintenance

Key challenge

Interconnection with power grid @ 10 kV
- Phase unbalance
- Noise and harmonics distortion
- Peak loads



Efacec Engenharia e Sistemas, S.A.
Transportation Area

Parque empresarial Arroteia (Poente), Apartado 1018 • 4466-952 S. Mamede de Infesta • Portugal
Ph. +351 229 402 000 • mktransportes@efacec.com • www.efacec.com/transportation
www.efacec.com

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