



0390 – DEMOCRAT

DEMONstrator of a miCro grid integRating sTorage

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Introduction

The DEMOCRAT project aims at demonstrating an integrated and innovative micro-grid concept applied to LV and MV networks, as a suitable solution for efficiently managing their Distributed Energy Resources (DER), working simultaneously as a flexible asset of the Distribution Networks.

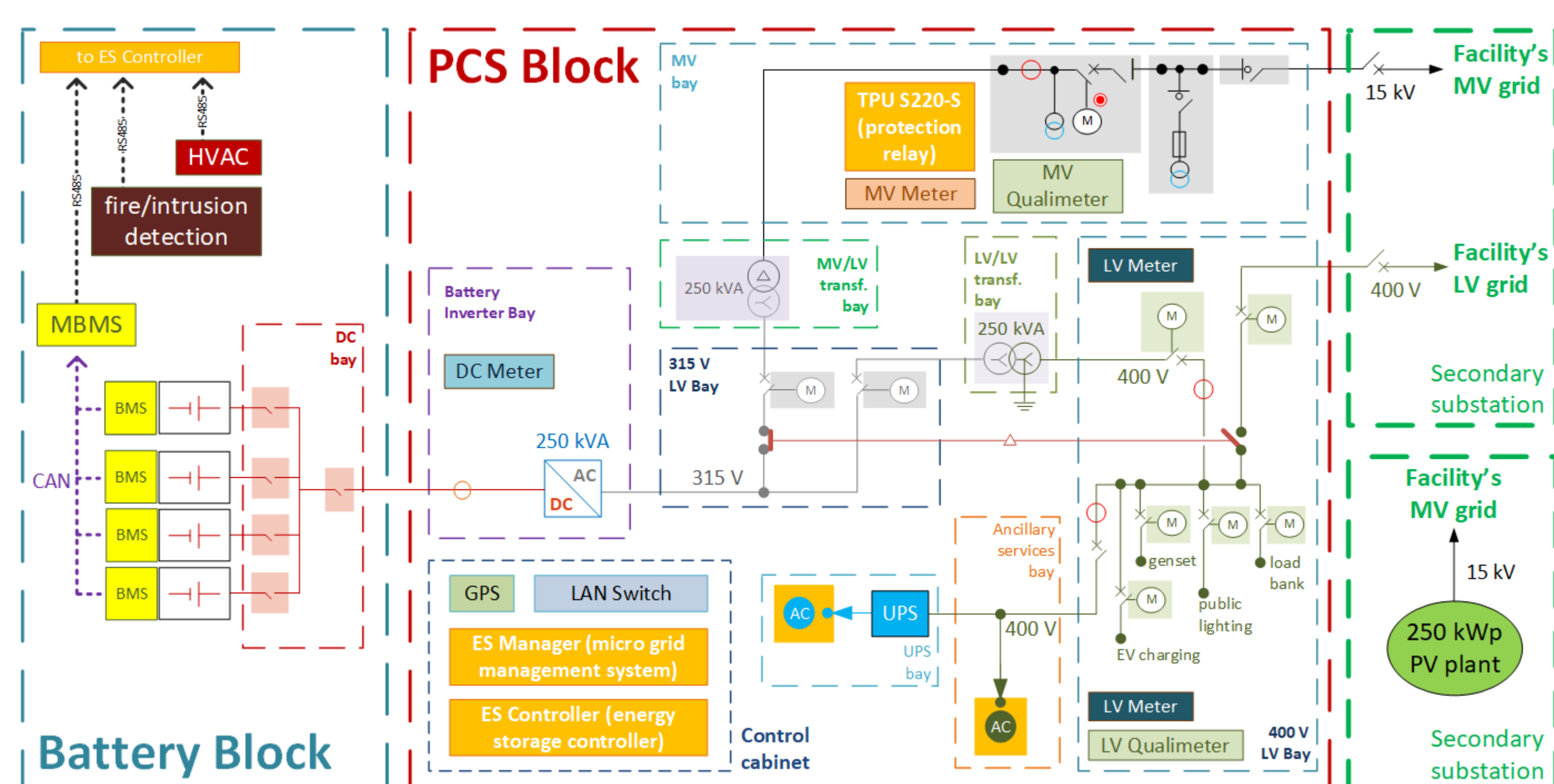
Project goals:

- Micro-grid operation in on/off-grid mode
- Technical integration of renewables through the storage system
- Intelligent and centralized control of Electric Vehicle charging as well as public lighting

Energy Services Simulator

- Economic Simulation - Simulation of Energy Markets and simulation of DR programs
- Technical Simulation - Micro-grid exploitation studies and assessment of the impact of different network operations

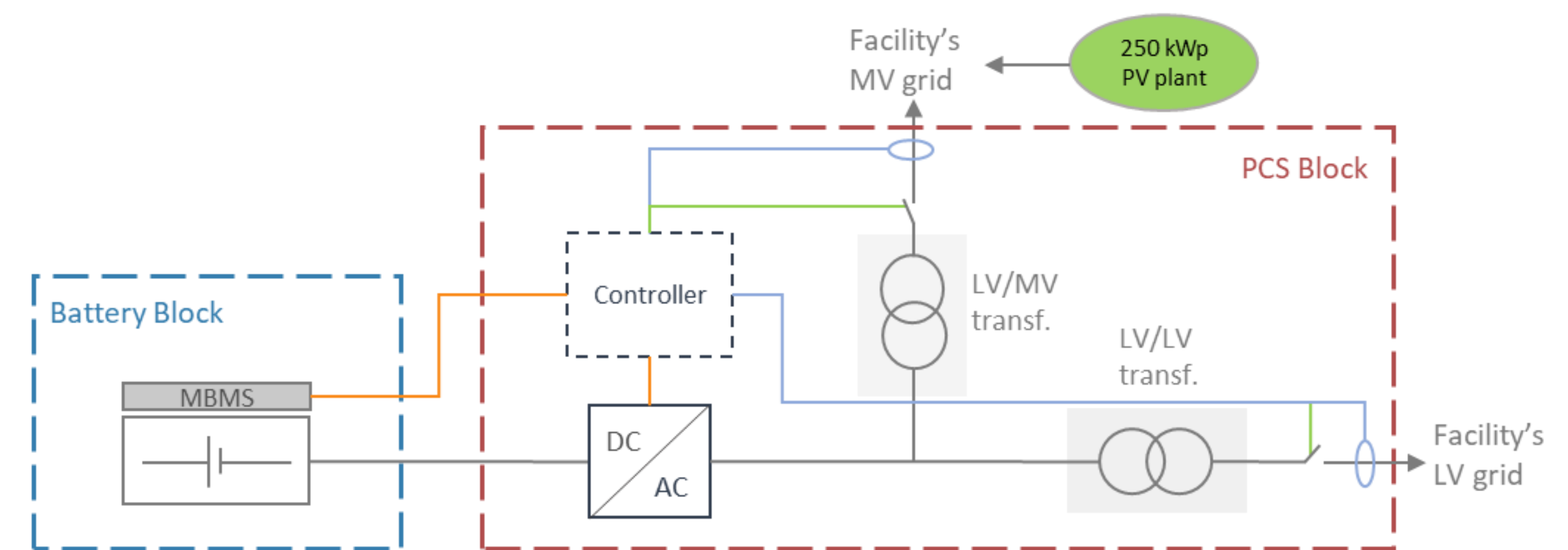
DEMOCRAT architecture



Use Cases and Potential Impact

Storage connected to LV or MV grid

- Load following, local voltage control, phase balancing
- Compensation of the PV power fluctuations, reducing the load in peak periods



Storage as an EV charging buffer

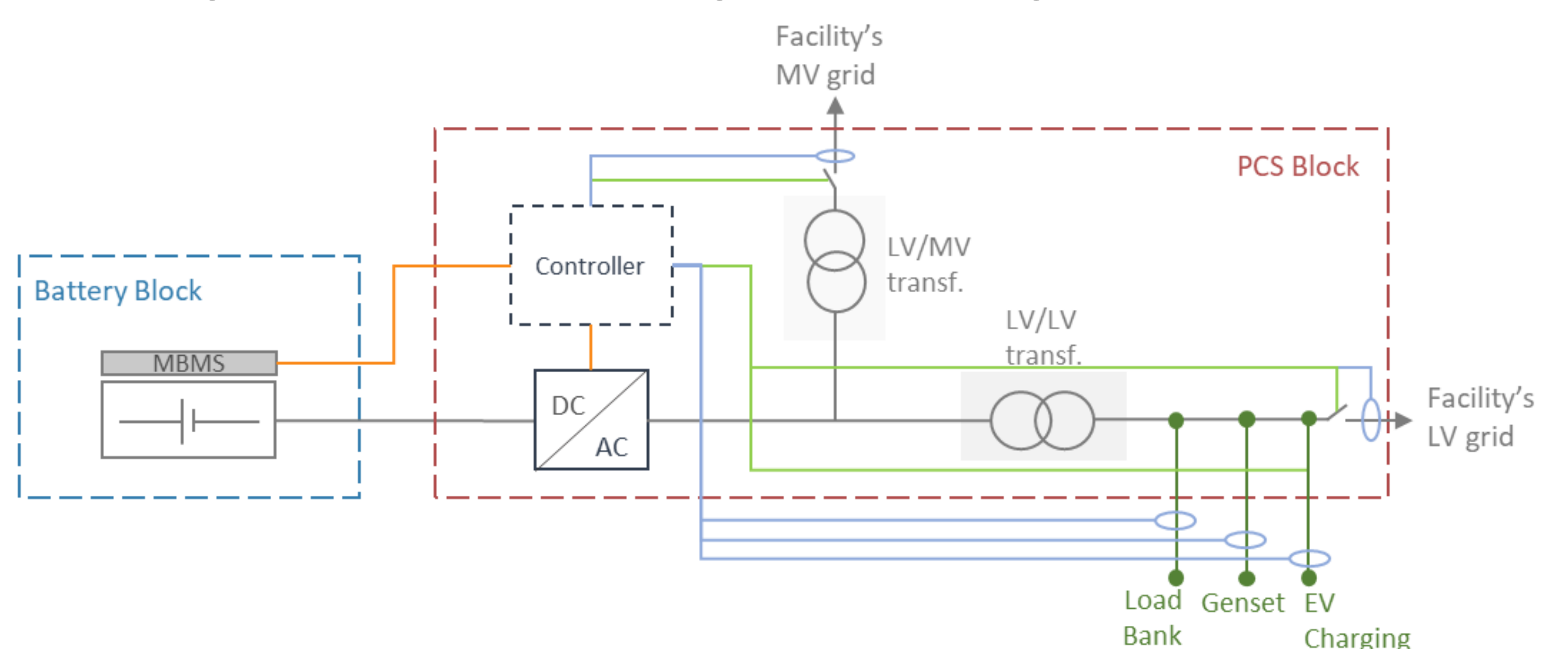
- Alleviate peak demand during fast charging
- Economic optimization of charge & discharge

Micro-grid, isolated or connected to LV or MV grid

- Possibility of micro-grid operating in off grid mode, with resynchronization for grid tied operation

Hybrid off-grid systems – 2 operational strategies

- Genset works as the single voltage source with storage system providing “grid supporting”
- No genset, with storage providing “grid forming”



Conclusions and Perspectives

The DEMOCRAT aims to create the necessary conditions for micro-grids to be able to deal with local constraints, as well as to increase the renewable energy penetration while operating more efficiently, providing flexibility to the grid towards the deployment of smart grids.

Key words

Micro-grids, Storage, Flexibility, Integration of Renewables, Improved EV charging fit

Main components:

- 200 kW / 200 kWh Li⁺ battery
- 250 kVA Battery inverter
- LV/MV & LV/LV transformers
- Control & management system
- Metering system
- Power quality system
- EV charging stations and public lighting
- 250 kWp PV plant
- Controllable loads



battery testing site