



Fig. 5. Battery side converter topology.

5 Conclusion

This paper presents pilot project of an integrated demand-side management (DSM) system, which aims to reduce electricity bills for industrial customers. The DSM system includes control and hardware solutions with specific focus on integration of multiple battery technologies, facilitating second-life use of vehicle batteries in stationary applications. System control includes a management structure and a group of forecasting and optimization algorithms for the operation of the energy storage system (ESS). The management structure has two control levels: remote and local. The remote system is allocated in the cloud and carries out the economical optimization of the energy consumer calculating an optimal operation schedule for the next 24 hours based on forecasts and estimations. The local system adapts the 15-min step schedule to the real-time consumption of the customer. This management system is able to reduce the electricity bill and if combined with a PV system, it also maximises self-consumption.

The back-bone of this management system is the energy storage system. It has been designed to use different types and technologies of batteries and with different SoH, including regenerated batteries, which reduces system costs and the environmental impact of the batteries.

The project is still ongoing. Thus, final quantification of savings at the demonstration site will be available at the end of the test operation phase.

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