

MASTER'S THESIS PROPOSAL

Battery Storage for Grid Support and Charging in Ports

Subject area: Electrical Engineering – MPEPO, Electric Power, Power System Analysis, Storage

Background Today, many shipowners are considering battery power for propulsion. However, the availability of shore-side power, the speed of charging and the capacity for charging is holding them back. One solution is to install Energy Storage Systems (ESS) in ports. DNV GL will carry out the EU-funded project "Sea Li-ion" together with the companies Battery Loop, Stena Recycling, Stena Rederi, Stena Line and the ports of Gothenburg and Kiel, mapped out. The ultimate goal of the Sea Li-ion project is to lay the ground for the investment of two ESS in the ports of Gothenburg and Kiel to boost electrification of the maritime sector using lithium-ion batteries.

Assignment The objective of the proposed master's thesis project is to assess the potential grid impact and grid benefit of the ESS in the ports of Gothenburg and Kiel. The following topics will be included in the project (the student/s are encouraged to suggest other/additional topics):

- A literature study on battery storage in ports and harbors with focus on the Nordic countries.
- A review of the shore-power conditions and facilities and the need for energy storage in the two ports Gothenburg-Kiel. Including analysis of the port-to-grid connection setup, available grid capacity and grid reinforcement possibilities. This is foreseen to be in collaboration with the ports and the local grid owners/operators.
- Assessment of the ability and potential of the ESS to provide grid stabilizing ancillary services including: peak shaving/shifting, frequency support, voltage support, etc. Evaluation of the technical requirements to provide ancillary services.
- Modeling and simulation in suitable software, PSS/E or PowerFactory, of the grid connection setup, the battery storage units and the port loads. The analysis performed will include e.g. load flow, frequency dynamics, voltage dynamics and harmonics and contribute to the grid impact assessment.

The work presumes the students have good knowledge of electrical power systems and knowledge of battery storage for grid use.

Information The work is suitable for 1-2 students. Working place will be provided in the DNV GL office in Gothenburg. Swedish language is preferred, but not a requirement. The project provides the possibilities for international collaboration within DNV GL and with the Sea Li-ion project participants. Financial compensation will be provided.

Application Send your interest via email together with your resumé and grades to:
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