Master Thesis Project

Electrified vessels charging solutions

Background

Electrification of transports is increasing. For land transport there are several charging possibilities emerging such as combinations of nightly charging and fast charging, battery swapping, electric roads, etc.

Different transport segments have different specific needs when it comes to electrification. For water transports (shipping and ferries) these needs are also dependent on the harbor charging infrastructure as well as the different technical requirements connected to trip lengths and possible limits on the waiting time flexibility when combined with commercial usage of the vessels. 

So far shipping has in general been electrified to a very small extent with vessels operating on short routes with many stops being the best electrification candidates. Some charging solutions, such as battery swapping, may alleviate waiting times and electrical grid loads, but might require more battery usage than pure electric vessels.

It is therefore of high interest to investigate how different charging solutions compare to each other for different cases and scenarios. This master thesis is expected to contribute to such knowledge.

Goal

- Description of known functioning charging solutions for water transport or studies relevant to the Swedish context.
- A model to evaluate the electrification potential and the need of batteries for an example vessel fleet in several scenarios with and without battery swapping.
- Discussion and analysis of the effect of different charging techniques solutions (environmental aspects, costs, battery lifetimes).

Work outline

1. Literature study for vessels charging concepts in Sweden and internationally. What are the requirements, what known solutions are there? Gather data and select cases to model.
2. Modelling / calculations for a relevant case of an example fleet (e.g. a ferry) that capture the driveline characteristics and cycles. Comparison between regular charging and battery swapping. What possibilities and challenges are there for the different options?

Ability to work independently and to take initiatives is required, as well as experience in simulations (e.g. Matlab/Simulink). The application should include cover letter, CV and transcripts.

Time plan and Contact

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