HEADING

Energy flows and potential energy development strategies in RoRo ports – a study based on the Port of Trelleborg.

INTRODUCTION

This study collected, visualized and analyzed the flows of energy in the port of Trelleborg. Based on these, it proposed some innovative energy strategies to guide the port's development as an energy hub.

MAIN TEXT

Ports have been an essential cog in the shipping industry machine ever since its inception, as they represent the crucial interface between land and sea transport. As the industry shifts towards more sustainable operations, ports are presented with a huge opportunity to further increase their importance by providing essential energy services to the sector and the regions surrounding them.

To achieve this goal, ports need to develop a solid decarbonization and energy development strategy. This was the first study to deep dive into what this might look like for RoRo (roll-on, roll-off) ports. Data was collected from the Port of Trelleborg, one of Europe's largest RoRo ports, and sorted to obtain a picture of the current energy landscape in the port. It was found that electricity and fuels are the main actors in play, as they drive the majority of the port's equipment, with the energy provided by fuels currently being around 1.5 times larger than that from electricity. In the future, the demand for electricity is expected to increase significantly in an attempt to reduce emissions in the port: the main drivers for the increased electrical demand are the potential conversion of the port's working vehicles to electric power and an increased demand for shore-to-ship power from docked ships. Combined, these two factors could lead to an electricity demand 400% larger than the one seen today. The predicted demand is equivalent to the electricity consumption of 930 single-family households!

Another important topic for the future is fuels: as batteries are not generally suitable for long distance travel, both the maritime and land transport industry are looking to alternative fuels to power their operations in the future. While it is still unclear what the fuel of choice will be for either of these industries, this is still a great opportunity for ports to strengthen their position by providing, and perhaps producing, the fuels of the future.

To prepare for these advancements, ports should strongly invest in their electrical infrastructure. There is huge potential for electricity generation within ports, with solar and wind solutions already showing great potential for financial returns. Wave energy and biogas-powered fuel cells are more niche solutions, but also show promise in certain situations. The latter in particular is also a producer of hydrogen, which is the most likely candidate to power the land transport industry in the future. Hydrogen could also be produced by coupling an electrolyser system with the aforementioned solar and wind installations, as the electricity they could potentially produce far outweighs the needs of the port. In fact, the wind and solar installations proposed in this study would produce more than 600% of the electricity used by the port in 2022, or enough to power 1480 households. Both solutions have been shown to be profitable when selling the surplus electricity directly, or when using it to produce hydrogen.

Ports are here to stay, continuing their millennia-long legacy as central hubs for human trade and travel. Now, as the world becomes more environmentally conscious, they have the opportunity to add a further feather to their cap by becoming key interfaces for the flow of energy between land and sea, as well as evolving into specialized producers of energy to fully satisfy the demands of their clients. This work hopes to highlight this great potential available in ports, and to be an inspiration for RoRo ports worldwide to guide their investments in energy technologies.