Battery System Concepts for Fully Electric Vessels

Dear reader,

The end of the year 2022 is approaching and so is the midpoint of our project. That seems like an excellent moment to present to you our 3rd newsletter with the latest progress updates. Let's get to it!
After 21 months, the consortium was finally able to completely *and* physically meet. Damen Shipyards hosted the SEABAT consortium at their facility in Gorinchem, The Netherlands. During our general assembly, we not only discussed the project, but were also able to visit one of Damen's hybrid-electric ships. A good potential candidate for SEABAT's Hybrid Energy Storage System!
In addition, we had multiple opportunities where you could meet us. Our first academic workshop took place in Spain, hosted by Ikerlan & Mondragon University, and we attended the TRA in Lisbon. Keep an eye on our website if you want to meet us again in the future. The second academic workshop is coming up, as well as another stakeholder workshop and some other events.
We could have all these activities, because we took major steps forward in our research. In this newsletter you can find the latest advancements on our system architecture. In the last newsletter, we presented to you why we continued with the module-level converter topology; now we can present the first modular and flexible battery system design. Furthermore, you can read upon the status and perspectives on the realization thereof. For those who want a more in-depth academic understanding, we have published an open-access paper.

So have a great time reading our newsletter!

Dr.ir. Jeroen Stuyts
SEABAT project coordinator

SEABAT Facts and Figures

Solutions for large batteries for waterborne transport

15 partners from 8 countries

9.58 M€ Funding from EC in H2020 program

48 months started 1 January 2021

Project

The SEABAT project follows a 6 steps approach to come to 3 key innovations:

Step 1: Development of an overarching system architecture for full-electric hybrid topologies.
Step 2: Creation of a modular hybrid high energy and high-power battery pack.
Step 3: Designing and developing a novel converter concept
Step 4: Developing a battery **m**anagement **s**ystem that can handle a range of hybrid battery lay-outs.
Step 5: Proving the reduction of the production process costs in an industrial pilot.
Step 6: System integration and validation.

On the SEABAT website you find a more detailed explanation of each step and aimed innovations.

Results WP 3

The two main objectives of work package 3 within Seabat are:

1. The development of a modular and scalable hybrid battery system architecture for waterborne transport allowing storage capacities of over 1 MWh.
2. Define the preliminary design of such a battery system at +-300kWh with a reduced cost compared to current state-of-the-art.

The SEABAT topology that will be developed is selected based on the evaluations within T3.1, as discussed in our previous newsletter. The distributed converter topology was identified as the best overall topology for SEABAT's modular & flexible battery system design. If you want to know more about the ongoing design, read the full article at the website via this link.

Introduction WP4

WP4 "Design and development of the components for a modular and flexible hybrid-battery system towards low cost" has started now! The Hybrid Energy System (HESS), three-level architecture and preliminary design have been defined in the SEABAT project. Therefore, under the guidance of IKERLAN, we started the design and development of electrical, mechanical and therman components of the HESS. Read more about the first results by clicking here.

Publications

EPE 2022 Conference

During the EPE 2022 Conference from 5-9 September in Hannover, Germany a delegation of Flanders Make presented their article "Battery Hybrid Energy Storage Systems for Full-Electronic Marine Applications".

Interview Horizon

On November 16, project coordinator Jeroen Stuys of SEABAT was interviewed by the Horizon Magazine. In this interview Jeroen talks about the importance of renewables and in-depth about the SEABAT project. To read more on this click here.

Publication

On the 16th of November, the article "Battery Hybrid Energy Storage Systems for Full-Electric Marine Applications" written by Flanders Make has been published in the scientific Journal of MDPI. The high cost of Lithium-ion battery systems is one of the biggest challenges hindering the wide adoption of electric vessels. For some marine applications, battery systems based on the current monotype topologies are significantly oversized due to variable operational profiles and long lifespan requirements. This paper deals with the battery hybrid energy storage system (HESS) for an electric harbor tug to optimize the size of the battery system. To read this article click here.

Energies
Article
Battery Hybrid Energy Storage Systems for Full-Electric Marine Applications
Mathieu Kalikatzarakis *, Jasper De Waard and Jeroen Stuys

Interview WP4 Leader

Amaia Lopez and her teams main activities at IKERLAN are the developing and testing of the SEABAT batteries. These activities are carried out by five IKERLAN teams all focussed on a different aspect. Read more on this interview here

Events

Academic Workshop at Mondragon

On June 10 2022, SEABAT organized a workshop on hybrid storage energy systems (HESS) at the Orona Ideo Campus (Hernani) of Mondragon Unibersitate. More info on this workshop can be found here. The recordings from the workshop can be found on Youtube via this link.

SEABAT at TRA

The TRA Conference was held in Lisbon from the 14th until the 17th of November. Among the 2000+ participants there was also a delegation of SEABAT present. On the 16th of November, Fabio Mandrile represented SEABAT and hosted a session with other H2020 projects on water transport. The goal of the session was to create a collaborative communication space for all three projects where each project could share their respective aims, objectives and latest results. Read more on this session by clicking here.

SEABAT Partners

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