

## EBDG'S CHIEF ELECTRICAL ENGINEER EXPLORES CUTTING-EDGE BATTERY AND CHARGING SYSTEMS IN SCANDINAVIA

In an effort to stay at the forefront of emerging technologies and provide valuable insights for our clients, EBDG's Chief Electrical Engineer, Will Ayers, embarked on a 10-day journey through Scandinavia exploring cutting-edge lithium-ion batteries and vessel charging systems (VCS).

The primary objective of the trip was witnessing the factory acceptance testing of advanced hybrid propulsion systems at **Siemens Energy** in Trondheim, Norway, designed for our esteemed clients at **Texas Department of Transportation (TxDOT)**.

Upon completion of the factory acceptance testing at Siemens Energy, Will extended his itinerary to span five countries, encompassing visits to five ferry operations, two VCS vendors, and two battery vendors. While on his journey Will had the opportunity to board six ferries utilizing battery propulsion, providing him with invaluable insights that he could bring back to enhance EBDG's capabilities in fleet electrification.

Notable experiences from Will Ayers' journey include:

- **3mar Offices in Turku, Finland:** Will explored the heart of 3mar, a company at the forefront of innovative charging and automooring solutions, gaining insights into their cutting-edge technologies.
- **Parainen-Nauvo Ferry Crossing in Finland:** The ferry crossing in Finland onboard ALTERA provided a practical understanding of how battery propulsion is integrated into maritime transport. This included the rugged and reliable VCS supplied by **Cavotec**.
- **Echandia's HQ in Stockholm, Sweden:** Will visited Echandia's headquarters, contributing to a comprehensive understanding of the state-of-the-art battery systems in the industry. Echandia's LTO chemistry has an incredible cycle life and charging characteristics that may be beneficial to a wide variety of marine applications.
- **ELLEN in Søby, Denmark:** ELLEN, based on Ærø island, became a focal point of Will's journey, courtesy access arranged by 3mar. The visit offered direct exposure to the practical aspects of battery propulsion and its potential impact on EBDG projects. It was also a follow-up to a similar 3mar-arranged tour in 2019 and the two visits helped emphasize the lessons learned over this time.
- **GROTTE on Esbjerg-Fanø Crossing in Denmark:** The plug-in vessel, GROTTÉ, showcased yet another facet of battery-powered maritime transport on the west coast of Denmark, including the pioneering VCS supplied by **Zinus Power**.
- **HOLMEN "Waterbus" in Copenhagen:** Echandia arranged a unique experience on the HOLMEN waterbus, powered solely by their LTO batteries, which emphasized the versatility and reliability of this evolving technology.



*Will Ayers at Siemens Energy for factory acceptance testing of advanced hybrid propulsion systems for TxDOT.*



- **Stemmann-Technik in Schüttorf, Germany:** Will had a chance to visit Stemman-Technik's world-class manufacturing facility and explore the heart of their latest charging tower. Destined for the Puttgarden-Rødby route, it operates at a world-leading 15kV and 25MW, highlighting the immense potential of advanced charging infrastructure.



*Markku (3mar) & Will Ayers (EBDG) in front of 3mar Charging arm.*



*Will Ayers in Søby, Denmark in front of ferry vessel ELLEN.*



*Will Ayers at the Parainen-Nauvo ferry crossing in Finland.*

Will Ayers' journey not only provided a wealth of firsthand knowledge but also opened doors to potential collaborations and innovations. The insights gained from this expedition are expected to significantly influence EBDG's approach to hybrid projects.

As EBDG continues to push the boundaries of innovation in maritime engineering, our exploration of battery and charging systems in Scandinavia stands as a testament to our commitment to delivering cutting-edge solutions to our clients. The lessons learned and experiences gained during such trips will undoubtedly shape the future of EBDG's involvement in the electrification of maritime fleets.