



Innovation
Networks

Battery
Systems

The background features a dark blue field with a complex network of glowing blue lines and dots, resembling a digital or molecular structure. A large, stylized battery is depicted in the center, composed of a wireframe mesh. A thick, curved band, colored green and orange, arches over the battery. Horizontal streaks of light blue energy or lightning pass behind the battery.

Batteries for.. Maritime

Q&A document

Q&A

- Could this "revolution" revive UK maritime dominance and a rebuilding of what used to be one of our greatest industries: Ship Building - or are we still too expensive in our manufacturing?

There is ambition within government to reinvigorate UK shipbuilding. Before the latest spending review was reverted to a 1-year programme there was significant support for the ship building sector written into that bid. This will be submitted into the next spending review.

- Is the 100% reduction in carbon emissions aspirational or is it included in Government policy?

NetZero by 2050 (rather than 100% carbon reduction) is the target set by the government which is legally binding. This applies to activities in the UK. For international shipping the IMO target is 50% GHG reduction.

- Could the introduction of more autonomy in ships maximise the energy efficiency of vessels?

Energy efficiency savings from autonomy do contribute towards achieving NetZero but they must be used in collaboration with other technologies to achieve more significant CO2 savings.

- Are there any interests in university engagements?

We are always open to talking to innovators but not actively seeking a collaboration with a university at this stage.

- Vertical takeoff for aircraft has exceeded expectations and is in sight of commercial aircraft. Is surface skimming a realistic possibility for commercial shipping?

For the larger vessels i.e. container and cruise ships we are unlikely to see hydrofoil technology utilised as the speed required to deploy the foils and lift the ship out of the water cannot be achieved. For smaller domestic shipping and passenger ferries hydrofoiling remains a possibility.

- Question to British Marine: Could you please elaborate a bit more on why "knots" in battery electric vehicles are much lower compared to ICT? (and therefore mileage is lower, too) Is it related to the lower power/energy capacity and thermal management of batteries?

Lower energy density, good article here: <https://ecoboats.com.au/is-electric-propulsion-suitable-for-my-boat/>

- What are the high-density battery technology is being pursued by British Marine? British Marine is the trade body representing leisure, small commercial and super yacht sectors of the overall maritime industry. They are not direct users of the battery technology however, some of their members are.

- To Artemis: Are the resistance in boats and ships are going to be higher than in electric vehicles? Would you say high temperature batteries would be more beneficial and suitable, which can provide high energy and power density compared to room temperature batteries?

We are using Li-ion and aren't considering other battery chemistries at this stage. We are of course following all of the latest developments and solid state looks exciting but this is still a few years off from being commercially available.

- What will be the capacity of the Artemis ferry battery packs, and do you anticipate difficulties with port charging infrastructure?

Yes, charging infrastructure is a significant challenge. As part of our UKRI supported Belfast Maritime Project, we will be developing a high-speed charging infrastructure, that will be used in the ferry pilot scheme in NI. The battery capacity of the ferry really depends on the duty cycle ranging from 2-4Mwh.

- To Artemis: What thermal management technologies are you looking at (or plan to explore) in order to address the requirement of high speed and significantly higher energy-dense batteries in future?

We are exploring both liquid cooling solutions and AC.

- After operating nuclear submarines for decades, has any R&D been looked-at, or ignored, regarding low-cost nuclear propulsion - or is this only a dream?!!

Nuclear has been mentioned as a low carbon propulsion source but not with any seriousness. It is not expected to be within scope for the future Clean Maritime Demonstrator funding but the full scope will be confirmed in March.

- @David - are you able to apply "F1 braking energy recovery" in the marine propulsion context?

Yes absolutely, we are already working with this technology.

- How is regulation and coding keeping up with battery technology developments to actually enable their use in maritime?

The MCA and leading certification organisations such as DNV.GL have type approvals set out for use of battery technology (Li-ion) in a maritime environment. As new technology is being developed and the uptake of batteries increases they are actively working to create further standards for safe operation to prevent policy being a barrier to entry in the market.

- To Port of London Authority: Could you please share some ideas/plans to address the challenge of developing charging infrastructure to cater to the huge power demand, as boats and vessels move towards complete electrification? What role would ultra-fast charging play to mitigate this challenge?

The PLA is investigating a number of solutions recognising the diversity and geography of demand. For some vessel types ultra-fast charging could help with their decarbonisation route and we will continue to investigate which infrastructure and locations make this achievable.

- To Port of London Authority: My company is developing ZE marine propulsion. Does PLA work with other ports to achieve the objectives? We are working with a major Asian port and it would be good to see if their needs are in line with the PLA.

The PLA works with a number of international partners, however in terms of the aspects of being in line; there is a great difference in terms of regulation and appetite for change across the world and there is a need for standardisation of some solutions that are useable in both a local context and those elsewhere, otherwise that will reduce the potential for shipping to decarbonise. PLA works as a member of the IAPH to understand these challenges and to promote learning between ports. PLA is also a member of the KTN's Decarbonising Ports and Harbours innovation network which contains numerous UK ports in its membership. Collectively they are all in discussion together to tackle this common challenge.

- To British Marine and Artemis: You mentioned about 'Safety'. Is it primarily fire safety (risks of thermal run-aways) in batteries? Or, is it something else that is more critical?

Fire/electrical safety, fire is the primary risk for these systems as the ability and circumstance of being able to leave the vessel and be safely rescued can be varied. Inshore vs mid ocean.

- Would our solar & wind powered boat project qualify as a Clean Maritime Demonstrator?

It is expected these technologies will fall within scope however, a full scope will be available upon competition launch which is expected in March.

- Any work in Si-based anodes?

We are using Li-ion and aren't considering other battery chemistries at this stage.

- Batteries will meet many of the solutions, if you can get hold of them! The automotive sector hold the majority of the capabilities and with vessels requiring many MWs there is no way currently of getting hold of this number of batteries within the UK. The UKBIC is not keeping up with International developers. Is the Marine Sector going to create its own battery centre?

There are no plans for a marine battery centre at this stage.