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Category: **Waterborne** Country: **United Kingdom**

Research Area 2: **Green Mobility and Decarbonisation** Idea Number: **63**

Developing energy saving solutions for hydrogen-powered waterborne transport

Decarbonisation of waterborne transport is arguably the biggest challenge presently faced by the maritime industry. By 2050, the International Maritime Organization (IMO) aims to reduce greenhouse gas emissions from shipping by 50%. To meet such targets, various strategies are being deployed. For instance, green hydrogen as an alternative fuel may be a solution to meet future targets to achieve a future clean shipping vision. The cost of hydrogen fuel is higher compared to conventional fuel, therefore energy saving devices (ESDs) for ships are more important than ever. However, existing, and emerging energy saving devices have not been researched to assess their compatibility for hydrogen-powered ships, presenting challenges and considerations within their design and operation. This project aims to bridge the gap by firstly identifying the new challenges that a hydrogen-powered propulsion system brings forth, reviewing the quantitative energy saving capability and qualitative additional benefits of individual existing and emerging energy saving devices in standalone and combination; investigate a novel concept conceptualised by the project team (tubercle-assisted propulsors) and its energy saving capability; and finally, draw up recommendations for the most compatible energy saving device combinations with hydrogen-powered waterborne transport presented to maximise energy saving and minimise the negative impact on the propulsion system. In summary, the most compatible combination of energy saving devices for hydrogen will depend largely on factors such as vessel type, route, propulsion, operation, etc. Through preliminary investigations throughout the project, tubercle-assisted propulsor technology has the potential to provide energy savings and mitigate load fluctuations, which will be favoured by the hydrogen powertrain.