

Tidal Energy in Malaysia: An overview of potentials, device suitability, issues and outlook

Abstract

Malaysia is heavily dependent on non-renewable energy sources for electricity generation, particularly fossil fuels such as coal, oil, and gas. However, the alarming increase in CO₂ emissions and the depletion of fossil fuel reserves have given rise to imminent challenges in meeting the strong demand for electricity in Malaysia. Thus, this paper explores various types of tidal stream devices that have been experimentally developed for electricity generation and are well established, with a specific focus on potential devices to be implemented in the shallow water environment of Malaysia. These devices are chosen based on the average Malaysian tidal stream velocity, which is approximately 1.0 ms⁻¹, and the average Malaysian water depth, which is approximately 30 m. The selection of the appropriate device is based on six fundamental criteria: (i) power density, (ii) scalability, (iii) durability, (iv) maintainability, (v) economic potential, and (vi) potential issues. Moreover, previous research and development (R&D) studies on tidal streams in Malaysia are taken into consideration in order to identify the most suitable device. Based on the review, it is concluded that the vertical axis tidal turbine (VATT) is the most suitable device for utilisation in the shallow water environment of Malaysia. © 2023

Keywords

Cross-flow turbine; Low tidal current; Marine renewable energy; Shallow water depth; Tidal extraction