



Powering a Greener Future with TR IEC/TS 62600 – Wave and Tidal Energy Converters

Harnessing the Potential of Wave and Tidal Power as a Renewable Energy Source

Tidal power is a sustainable source of energy that is reliable and predictable. Given the consistent nature of tidal patterns, it enables better integration with the power grid and lowers the need for backup power. Nevertheless, various challenges have been reported in the implementation and operation of wave and tidal power energy systems. These include biofouling from the buildup of organisms such as algae, mussels, barnacles and seaweed on the surfaces of the marine energy converters, which can cause obstructions in the device while increasing the weight and drag¹.

For countries with limited land space like Singapore, exploring such energy systems in the waters offshore opens up new opportunities to harness energy and diversify their renewable energy sources². In light of the unexplored energy potential of tropical waters, adopting the Technical Reference (TR)³ International Electrotechnical Commission (IEC)/Technical Specification (TS) 62600 series facilitates resource assessment and power performance evaluation methods that are suitable for such waters.

Wave energy converters (WECs) and tidal energy converters (TECs) are devices that capture power from the movement of waves and transform this into electricity. The standards on WECs and TECs provides a set of technical guidelines to advance the development of wave and tidal power systems in a safe and effective manner.

¹Soonseok Song, Weichao Shi, Yigit Kemal Demirel, Mehmet Atlar, The effect of biofouling on the tidal turbine performance, Department of Naval Architecture, Ocean and Marine Engineering, University of Strathclyde, July 2019. https://www.researchgate.net/publication/334327026_The_effect_of_biofouling_on_the_tidal_turbine_performance. Accessed 5 February 2024.

²The Straits Times, Singapore exploring hybrid energy generation system that taps wind, solar and tidal energy, 27 October 2022.

³A Technical Reference (TR) is a pre-Singapore Standard that is developed with the aim of meeting an urgent industry need.

About TR IEC/TS 62600

The TR IEC/TS 62600 series are standards for estimating, analysing and reporting the wave energy resource at sites potentially suitable for the installation of WECs. The TR series is to be applied at all stages of site assessment, from initial investigations to detailed project design, and in conjunction with the TR IEC/TS on WEC performance (TR IEC/TS 62600-100), enabling an estimate of the annual energy production of a WEC or WEC array to be calculated.

WECs and TECs offer considerable opportunities for coastal countries to generate renewable energy. Having quality and safety standards in place for marine energy will support the reliability and efficiency of such converters and guide industry expansion. Specifically, the IEC/TS 62600 standards help to:

- provide clarity on the safety and technical performance aspects of WEC and TEC installations;
- set the groundwork for improving the design of WEC and TEC systems; and
- foster consistency in evaluating the power performance of WECs and TECs.

Singapore has adopted the following standards from the IEC TS 62600 series:

- TR IEC TS 62600-1:2023 Marine energy – Wave, tidal and other water current converters – Part 1: Vocabulary;
- TR IEC TS 62600-100:2023 Marine energy – Wave, tidal and other water current converters – Part 100: Electricity producing wave energy converters – Power performance assessment;
- TR IEC TS 62600-101:2023 Marine energy – Wave, tidal and other water current converters – Part 101: Wave energy resource assessment and characterisation; and
- TR IEC TS 62600-200:2023 Marine energy – Wave, tidal and other water current converters – Part 200: Electricity producing tidal energy converters – Power performance assessment



Enterprise Singapore is the national standards body that oversees the Singapore Standardisation Programme through an industry-led Singapore Standards Council (SSC). The TR was adopted by the Working Group (WG) on Marine Energy, under the purview of the Electrical and Electronic Standards Committee. The WG comprises experts from government agencies, industry associations, marine renewable energy companies, vessel manufacturers, certification companies and ocean survey companies.

Benefits of Adopting TR IEC/TS 62600

Adopting TR IEC/TS 62600 offers several advantages to marine renewable energy companies, vessel manufacturers, certification companies and ocean survey companies, as experienced by Lita Ocean Private Limited.

Reducing Environmental Impact

Mr Yeo Yingda, Managing Director of Lita Ocean noted that implementing the TR enhanced Lita Ocean's reputation as a sustainable and environmentally responsible organisation. This enabled the company to attract more environmentally conscious customers and investors. He added that Lita Ocean incorporated recycled steel, aluminium and other materials in the fabrication of marine energy systems. These helped to conserve resources and reduce the company's ecological footprint. Furthermore, eco-friendly coating, anti-fouling coating and low volatile organic compounds were applied to hulls to minimise the release of harmful chemicals into the marine environment. Beyond reducing maintenance requirements, this also mitigated the corrosive effects of tropical waters.

Improving Efficiency and Quality

Adopting TR IEC/TS 62600 has allowed Lita Ocean to improve the safety and reliability of TECs. Additionally, it streamlined installation and maintenance, while paving the way for a more standardised and error-free process. This significantly reduced the need for costly rework and corrections. At the same time, in upholding the high quality of its products, Lita Ocean constantly innovates to stay ahead of the curve. This included designing a floating platform to test its marine energy device in Singapore waters.

Enhancing Regional Expansion and Staff Expertise

TR IEC/TS 62600 boosted Lita Ocean's ability to compete in diverse and emerging markets, and facilitated the company's market expansion in Southeast Asia to countries such as Indonesia. Moreover, it presents opportunities for employees to acquire skills and expertise in renewable energy technologies, which contributes to the overall capabilities of the company.

Pioneering Floating Tidal Power Systems

Dr Narasimalu Srikanth, Working Group Convenor on Marine Energy, noted that during the development of TR IEC/TS 62600, the international standards community has integrated relevant aspects primarily designed for temperate waters. The Energy Research Institute @ NTU (ERI@N) had adopted these standards and evaluated their effectiveness to ensure suitability for tropical waters as well. He added that prior to its publication, the standards for wave and tidal energy systems worldwide were specifically for seabed-mounted ones and applicable solely for temperate oceans. The TR was used by ERI@N to evaluate similar methods which includes assessing the energy resource potential and the right turbine sizing to optimise energy extraction for such waters, as well as conducting a techno-economic analysis of tidal energy systems.

Lita Ocean partnered with ERI@N and other industry stakeholders on the design and development of a floating tidal energy system that can be towed to different coastal locations for power generation. In 2017, Lita Ocean successfully launched the first-ever trial of such a system globally. Furthermore, through this partnership, Lita Ocean has gained valuable experience in developing new competencies, enabling the company to operate effectively in diverse international markets. The collaboration has also empowered Lita Ocean to successfully deliver floating platforms for marine energy projects.

In Summary

Adopting TR IEC/TS 62600 allows companies in the marine renewable energy sector to drive efficiency, capabilities and quality. In addition, they can enhance their reputation, boost their green credentials and potentially catalyse their growth locally and overseas.